ATTACHMENT J-1

STATEMENT OF WORK

FOR THE

CHECKOUT, ASSEMBLY AND PAYLOAD PROCESSING SERVICES (CAPPS) CONTRACT

06-17-2005

Table of Contents

List of Figures/Tables

CAPPS STATEMENT OF WORK

1.0 Contract Overview

The contractor shall perform payload checkout, assembly, integration and processing activities for International Space Station (ISS), Shuttle and Expendable Launch Vehicle (ELV) payloads consistent with Kennedy Space Center (KSC) designated responsibilities.

The contractor shall perform these responsibilities including program management; design, sustaining engineering, operation and maintenance of assigned flight, facilities and ground systems; information technology; logistics; and institutional support in the most cost-effective and efficient manner while supporting the government's top priorities for safety, mission success, and payload customer satisfaction.

The contractor shall perform all the necessary program management including technical and business functions to plan, implement, track, report, and deliver the required products and services described in this Statement of Work (SOW). The contractor shall provide all personnel and other resources, except as otherwise specified in the contract, necessary to accomplish these functions. The contractor shall affect these management functions while maintaining flexibility and responsiveness to changing requirements.

The contractor shall implement a comprehensive safety and mission assurance program that emphasizes safety, health, and environmental stewardship in accordance with the NASA Safety Hierarchy.

The contemplation of the parties to this contract is that the contractor shall have a broad mission in performing payload processing related functions for the government and designees. Therefore, the general scope of the contract covers any payload processing service or related activities arising from the SOW in support of human exploration and development of space and earth and space science exploration.

2.0 Program Management

The contractor shall develop, update and implement a Program Management Plan (DR-1) to provide the programmatic services encompassing operational, business, budgetary, risk, and schedule planning for program related functions.

The contractor shall integrate program and project requirements and policies at all locations required to support this contract.

The contractor's program management approach shall include the establishment of work plans that integrate cost, schedule and technical baselines. The contractor shall implement project controls for managing changes to the integrated cost, schedule and technical work plans.

The contractor shall provide the government unrestricted access to all data generated in the performance of this contract.

The contractor shall ensure that all contractor personnel are trained and certified for assigned tasks prior to performing tasks within functional work areas.

2.1 Program Control

The contractor shall perform program management including:

- Developing and implementing payload processing policy and planning consistent with agency, program and center directives, policies, and operating procedures
- Assessing cost, schedule and technical risk
- Assessing and reporting performance to plan
- Integrating safety, reliability, maintainability, mission assurance and engineering
- Maintaining configuration control of assigned hardware, ground systems, and software
- Identifying and implementing continuous improvements to key processes
- Managing developmental efforts to meet technical, cost, and schedule requirements
- Establishing a process for developing, updating and tracking Memoranda of Understanding (MOUs) and Memoranda of Agreement (MOAs) with other KSC contractors
- Planning, participating and hosting program reviews, workshops, and presentations
- Preparing payload questionnaires, handbooks, and reference libraries for customer education and outreach
- Implementing a customer advocacy program
- Developing and tracking metrics and other data to measure the overall progress and work content of payload processing
- Coordinating lessons learned and implementing resultant findings

Currently, there are standardized plans, practices, procedures, understandings and agreements jointly developed and used by the current contractor, government personnel, payload customers and other KSC contractors. While this is a performance-based contract, there are required critical plans, procedures and practices essential to safety and mission success that must be initially followed while the contractor develops their own plans, procedures and practices. These critical plans, procedures and practices are documented within the Launch Site Support

Plans (LSSP), Standard Practices and Procedures (SPPs), MOUs/MOAs, and Operations and Policy Directives (OPDs). The contractor should analyze the plans, processes and procedures to identify safe alternative methods and improvements, model revised practices and procedures, and propose revisions to these documents. Revisions will reflect the contractor's best judgment and strategy for mission success.

Some MOUs/MOAs refer to contractors no longer working at KSC such as EG&G, Lockheed Space Operations Company (LSOC), and McDonnell Douglas Space Systems Company (MDSSC). Nevertheless, the intent of these MOUs is still being honored by the present Joint-Base Operations Service Contractor (J-BOSC), Space Gateway Support (SGS) and the Space Flight Operations Contractor (SFOC), United Space Alliance (USA). References to EG&G should be interpreted as SGS, LSOC as USA and MDSSC as The Boeing Company Payload Ground Operations Contract. NASA will provide new civil service points of contact for NASA organizations in the referenced documents.

The contractor shall comply with existing LSSPs, SPPs, Standard Repair Procedures (SRPs), OPDs, Safety Variances, Ground Safety Review Panel (GSRP) approved payload ground safety packages, and MOUs/MOAs until completed, modified or cancelled. The contractor shall obtain NASA approval for modifications or cancellations to the above listed documents. MOUs/MOAs between the contractor and other KSC contractors do not require NASA approval. The contractor shall revise all existing SPPs, SRPs, MOUs, and MOAs to reflect their own strategies for mission success and to correct KSC contractor and government organizations within one year of contract start. The contractor shall develop, update and implement newly required plans, processes and procedures.

2.1.1 Risk Management

The contractor shall develop, update and implement a Risk Management Plan (DR-2). The contractor shall develop and implement a management approach for identification, analysis, planning, tracking, controlling, documenting and communicating risks associated with:

- Human space flight safety issues
- Mission success criteria
- Problem resolution
- Developmental projects
- Budget limits
- Launch window and vehicle/carrier availability
- Security or environmental concerns
- "Fail ops/fail safe" requirements
- Technology readiness
- Oversight requirements
- Amount and type of testing

The contractor shall provide risk assessments (DR-3) for each identified risk requiring government attention.

2.1.2 Customer Advocacy

The government will make formal commitments and agreements with KSC's external customers. External customers of KSC include International Partner/Participant (IP/P), NASA contractors, commercial entities, payload developers, other NASA centers and government agencies.

The contractor shall provide customer management support to the government for ISS and shuttle payload customers. The support includes, but is not limited to, conducting internal KSC planning meetings, assisting customers in defining launch site requirements, documenting launch site requirements, developing the LSSPs, maintaining documentation libraries for design package reviews, and providing project management, logistics and technical support to Ground Operations Working Groups (GOWGs)/Technical Interchange Meetings (TIMs). The contractor shall assess payload customer requirements internal to KSC and provide capability assessments to the government.

The contractor shall participate in the NASA customer survey process for all external payload customers by providing regular inputs to and maintenance of the Payload Customer Survey (PCS) database to collect NASA survey results, assisting in identifying customers, and participating in the response screening panel.

2.1.3 Work Control & Scheduling

2.1.3.1 Payload Integrated Planning and Scheduling

The contractor shall develop, implement, update, and maintain a work control process to include planning, scheduling, executing, monitoring and improving payload processing activities. The process shall integrate the activities of the CAPPS contractor, NASA Utilization, payload customers, other KSC contractors, and the ISS, Space Shuttle Program (SSP), and ELV program. The contractor's work control process shall integrate processing activities across all areas of the SOW to optimize resources. The contractor's work control process shall respond to schedule and requirement changes and provide daily performance-to-plan status.

The contractor shall implement an integrated scheduling system to identify high level milestones, mission processing activities, detailed processing activities, and deliverable milestones (DR-5). The scheduling system shall:

- Provide the capability to integrate KSC data and milestones into ISS and Space Shuttle program milestone scheduling systems. For ISS payloads and elements, the contractor shall input the data into the International Space Station Program's (ISSP) Common Schedules Database (CSD) per the Integrated Schedule Planning Process Document (ISPPD) (DR-6) and participate in the ISSP-wide Schedule Management and Resource Team (SMaRT). For non-ISS shuttle payloads, the contractor shall input data into the space shuttle's Flight Assignment Menu Operating System (FAMOS) file servers per JSC 25677, FAMOS Interface Control Document (DR-6) and support the monthly Johnson Space Center (JSC)-SSP Scheduling Systems Working Group.
- Identify the critical path for each mission for management by the contractor
- Be electronically accessible to multiple government, payload customers and other contractor users.

The contractor shall integrate payload customer activities with all contractor activities when they include:

- Hazardous processing activities
- Impacts to any other payload processing activity
- Resources such as KSC personnel, Ground Support Equipment (GSE), and other services
- Milestone activities that affect integrated operations or other payloads/missions

The contractor shall schedule activities including, but not limited to:

- Work Authorization Documents (WADs) to be implemented
- Personnel required for each activity
- Parts required to implement the task
- Handling and testing equipment
- Crane operations and maintenance
- Facility and GSE maintenance tasks that impact operations
- Communications support
- Consumables required from other contractors
- Non-Destructive Evaluation (NDE), sampling and support required from the CAPPS contractor or other organizations and contractors
- Heavy equipment
- Door operations support
- Concurrent hazardous activities
- Photography and imagery

The contractor shall identify and resolve all resource conflicts and constraints including:

- Technicians, quality, safety and engineering personnel
- WADs ready to be worked
- Logistics support (all parts kitted and ready to support scheduled job)
- Handling and testing equipment
- Facility outages
- Facility maintenance tasks affecting operations (including cranes)
- GSE maintenance tasks
- Overhead crane usage
- Support (personnel, consumables, equipment) required from other organizations and contractors
- Electromagnetic Interference (EMI) incompatibilities (conflicts with powered-up testing and ordnance)
- Hazardous operations
- Testing operations

The contractor shall integrate and coordinate payload processing activities with the SFOC contractor for Shuttle integration.

The contractor shall record and analyze as-run scheduling data for all daily processing activities and maintain historical data to develop and implement lessons-learned for process improvements. The contractor shall produce a Post Flight Data Report for each mission (DR-7).

The contractor shall report performance-to-plan at the government weekly management operations meeting. The report shall address any recent anomalies; upcoming payload

customer support issues, concerns and operations; facility and GSE utilization concerns; budget status; and any new development or modifications activities. The contractor shall provide minutes and track and maintain an action item log.

2.1.3.2 Operations Desk

The contractor shall provide an operations desk in the Space Station Processing Facility (SSPF) and Operations & Checkout (O&C) building highbays to support payload processing activities.

The operations desk shall:

- Provide a single point of contact for critical activities and emergency response issues
- Track and provide progress of processing area activities to the government and payload customers
- Coordinate real-time processing requirements and resolve conflicts with priorities and resources
- Notify appropriate government and payload customer representatives of flight hardware, GSE, and facility issues and problems

2.1.3.3 Multi-flow and Manifest Assessments

The contractor shall perform manifest assessments including resource utilization for government provided Shuttle and ELV manifests and ISS assembly sequences. At a minimum, after every Shuttle manifest baseline and assembly sequence revision, the contractor shall produce long-range (through the end of the manifest) and short-term (the next 12 months) multi-mission planning assessments (DR-8) per KDP-P-1069, Payload Multi-flow Assessment (MFA) Development showing resource utilization (floor space, GSE, work stands, test equipment, and other resources). The contractor shall coordinate element and mission unique facility utilization requirements. The unique facility requirements include, but are not limited to, crane lifts, GSE layout, floor space allocation, and hardware arrival and departure dates. The contractor shall assign the resources, recommend facility assignments (the government will make final facility assignment decision) and produce an assessment reflecting the resource allocation. The contractor shall identify resource conflicts, recommend options for resolution, and implement and coordinate the solutions.

The contractor shall produce a report using three-dimensional and two-dimensional models of the flight hardware, processing areas and GSE, in the Payload Processing Facilities (PPFs), including the SSPF and O&C. The report will show the two and three-dimensional views of the layout of flight hardware and ground support equipment in all of the facility test areas of the SSPF and O&C (DR-8).

2.1.3.4 Work Shift Guidelines

The contractor shall comply with KNPR 8715.3, KSC Safety Practices Procedural Requirements for maximum work time rules and plan for the shifting guidelines shown in Table 2-1.

Table 2-1 Work Shift Guidelines

Function	8-Hr Shifts / day	Days / Week	Surge Capability
Payload customer operations support **	1st shift, 2nd shift	Monday-Friday	On-call
Launch site services supporting payload customer operations **	1st shift	Monday-Friday	2 shifts, 6 days
Payload operations at Shuttle facilities (Orbiter Processing Facility [OPF], Payload Changeout Room [PCR], Landings)	1st shift, 2nd shift	Monday-Friday	Possible weekends and holidays per shuttle scheduling.
Active Multi Purpose Logistics Module (MPLM) Pre-launch and Post-landing Refrigerator/ Freezer support	24 Hours	7	
Contractor-led payload processing	Contractor propose	Contractor propose	Contractor propose
Contractor-led integrated testing	Contractor propose	Contractor propose	Contractor propose
NASA-led Utilization testing	1st shift	Monday-Friday	24 hours x 5 days
NASA-led Multi-Element Integrated Test (MEIT)	Extended 1st shift (12 hours)	7	24 hours x 7 days
NASA-led Integrated Systems Test (IST)	Extended 1st shift (12 hours)	Monday-Friday	24 hours x 7 days

*All shifting is nominal and may change to meet new requirements and schedules
** The contractor shall support extended processing of requirements for Mars Exploration Rover (MER) A and B from April through July 2003.

2.1.4 Configuration Management

The contractor shall develop, update and implement a Configuration Management Plan (DR-9) for assigned hardware listed in Appendices 2, 5A, 5B, 11, 12, 13, 14, and 16. Hardware and software will be added and deleted from the contractor's assigned responsibilities based on changes to the Appendix 4 manifest and ground system requirements.

The contractor shall identify and integrate impacts for government approval, including quick turnaround Rough Order of Magnitude (ROM) cost estimates, for new initiatives and design, schedule and requirement changes at the request of Program Review, Control Board, Panel, Working Group and Team Chairs. These changes include:

- Interface Control Document (ICD) Preliminary Interface Revision Notices (PIRNs) and Interface Revision Notice (IRNs)
- Engineering Change Request (ECRs)
- Engineering Change Proposal (ECPs)
- Engineering Support Request (ESRs)
- Field Engineering Changes (FECs)
- Logistics Management Responsibility Transfers (LMRT)
- Software Change Notices (SCNs)
- Launch Commit Criteria (LCC) Change Notices (LCNs)
- Shuttle Operations and Maintenance Requirement Specification (OMRS) Requirements Change Notices (RCNs)
- ISS Assembly, Checkout, Operations Maintenance and Configuration (ACOMC) changes
- Space Shuttle Program and Project Change Requests (CRs) and Special Requests (Chits)
- ISS CRs and Chits

The contractor shall operate a Configuration Management Receipt Desk that includes:

- A single point of contact for payload processing to various other Configuration Management (CM) Receipt Desks operated by the government, IP/Ps, and other contractors and payload customers
- Dissemination of meeting notices, agendas and CR packages to government, contractor and payload customer personnel at KSC (including notification of Utilization and shuttle personnel of ISS activities)
- Requesting impacts and comments to CR packages from government, contractors and payload customers
- Maintaining a log of changes requiring KSC action including: responsible lead organization, inputs due to and received from, and closed items
- Consolidation of the impacts and comments from NASA and contractor to CR packages
- Transmittal of the government-approved impacts and comments back to the controlling program CM Receipt Desk
- Generating and maintaining evaluation forms for each applicable change as coordinated with the designated government KSC CM representative

The contractor shall manage and operate a Configuration Control Board (CCB) for the formal disposition of GSE and facility ESRs and other engineering change documentation for contractor-sustained hardware and software. The contractor shall coordinate the disposition of ESRs and Facilities and GSE studies with the appropriate contractor's CCB including, but not limited to, the ISS Development Contractor, SFOC, J-BOSC, Expendable Launch Vehicle Integrated Support (ELVIS), and Consolidated Space Operations Contract (CSOC) when an ESR, study or engineering change will require action by another contractor.

The contractor shall update, maintain and operate an on-line cross-reference between the As Built and ISS Inventory Management System (IMS) to provide content and location information of installed hardware.

2.1.5 Data Management

The contractor shall develop, update and implement a Data Management Plan (DR-10), which provides for the management, preparation, publication, control, and distribution of data generated during the performance of this contract in compliance with NPD 1440.6, NASA Records Management. The contractor shall develop and maintain data repositories to support contract requirements including Data Requirements Document (DRD)/Data Requirements List (DRL) related products. The contractor shall provide for the handling and control of payload customer and proprietary data and software. The contractor shall provide a Data Accession List of documents produced and maintained for this contract.

The contractor shall maintain existing documentation and provide the library functions to catalogue, store (hardcopy and electronic), maintain and provide access to the ISS, Utilization Payloads, and Payload Carrier Acceptance Data Packages (ADPs) and closeout photos.

The contractor shall maintain and operate a repository for engineering documentation that includes a formal release system. The contractor's repository and release system shall include basic engineering drawings and all released revisions, for contractor drawings, vendor drawings, shop drawings and WADs.

Alenia will provide the library functions for the MPLM engineering drawings required to support processing. The contractor shall provide the library functions for the Node 2 engineering drawings required to support processing.

2.1.6 Work Authorization Documentation

The contractor shall develop, update and implement a WAD process that controls all work performed on flight hardware and software, facilities, facilities systems, GSE hardware and software. The contractor's process shall comply with KNPR 8715.3, KSC Safety Practices Procedural Requirements, and KDP-P-1064, Work Authorization Document (WAD) Implementation. The contractor's process shall perform configuration control of WADs, to include WAD publication, revision, and release. The WADs shall provide detailed instructions for all activities, identify hazardous activities and establish controls, track as built configuration, and verify all approved requirements are satisfied.

2.1.7 Requirements for Payload Processing

The contractor shall conduct payload processing activities in accordance with government approved requirement systems.

The current payload requirement systems are:

- OMRS per NSTS 08171
- ACOMC
- Payload Requirements Document/Payload Support Plan (PRD/PSP)
- Operations Requirements/Operations Directives (OR/OD)
- Shuttle LCC per NSTS 16007
- Time-critical Ground Handling Requirements (TGHR)
- ISS or Shuttle Special Request (Chits)
- Limited Operational Life Items (LOLI) and Time/Cycle requirements
- Repeatable Maintenance Recall System (RMRS)
- Design specifications, drawings and released engineering documents

2.1.8 Closed Loop Requirement Traceability Process

The contractor shall maintain, update and operate a closed loop requirements traceability process for assigned hardware, software, and facilities and for NASA-led activities. The contractor shall:

- Identify requirements applicable to the assigned missions for implementation
- Incorporate applicable requirements into mission planning documentation including WAD, facility utilization schedules and plans, and coordination with other KSC contractors
- Perform applicable tasks associated with satisfying the requirements
- Verify the requirements are satisfied from implementation documentation to requirement source following WAD execution
- Prepare, process and present waivers and exceptions for requirements that can not or will not be met for approval by the source authority

The contractor shall provide measures of performance to plan, waivers and exceptions to requirements in preparation for test readiness reviews and major milestone reviews including, but not limited to, flight hardware closeouts, payload bay door closure for flight and Certification of Flight Readiness (CoFR) reviews. Upon satisfactory completion of processing activities, the

contractor shall provide requirement closure reports to the requirement source authorities and the government.

2.1.9 Export Control

The contractor shall develop, update and implement an Export Control Plan (DR-11). The contractor shall identify an Export Control Plan Focal Point to the Center Export Control Working Group (ECWG) Administrator that will be the contractor's representative to support the KSC ECWG. The contractor shall apply for all required export licenses within 30 days of contract start.

2.1.10 Program Boards and Reviews

The contractor shall provide technical support to program boards, panels, teams, working groups, and reviews listed below:

- Certificate of Flight Readiness Reviews
- Program Requirement Control Boards
- Project, Vehicle, Element, Operations, Test & Verification Control Boards/Panels
- Integrated Test Requirements Group (ITRG)
- ISS Hardware Utilization Board (HUB)
- Payloads Operations Requirements Review (PORR)
- System Requirement Reviews
- Preliminary and Critical Design Reviews
- SSP Reinvention Process Integration Team (RPIT)
- Design Certification Reviews
- Ground Operations Reviews (GORs)
- Cargo Integration Reviews (CIRs)
- Payload Ground Safety Review Panel (Shuttle/Station/ELV)
- Pre-ship Reviews and Acceptance Review Boards
- In-Flight and Ground Anomaly Resolution Teams/Problem Resolution Teams
- Functional and Physical Configuration Audits
- Budget Review Teams
- Materials and Processes (M&P), Electromagnetic Compatibility (EMC)/EMI, Manifest, Launch Countdown and other Working Groups (WGs)
- Subsystem and Functional Group TIMs
- Crew Briefings
- Test Readiness Reviews
- Safety and Mission Assurance (S&MA) Analysis and Integration Team (AIT)
- KSC Institutional Reviews and Boards
- Government Weekly Operations Meeting

The contractor shall provide services, as described in Table 2-2, Review Support Matrix, to various program reviews, control boards and panels, WGs, TIMs, ad hoc or special issue teams, and all internal, payload customer and government readiness reviews leading up to the formal review or board meeting.

Table 2-2 Review Support Matrix

	Conference Rooms and Telecon Services	Agenda and schedule	Presen-tation material	Action items	Meeting minutes	Functional Support	Freq of Meeting *
ISS Material and Engineering Review Board	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Daily
Ground Safety Review Panel	S, T	Di, R	Di, R	A, Di	G, Di	Rc, E	Per Mission
S & MA AIT	S, T	S, De, Di, R		A	G, Di	Rc, E	Weekly
ISS Support Equipment Control Board	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Weekly
Ground Operations Review	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Per Mission
Payload Certificate of Flight Readiness Reviews	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Per Mission
KSC Ground Support Equipment and Facility Control Boards	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Monthly
Program Control Boards/Panel, Working Groups and TIMs hosted by KSC	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Quarter-ly
Space Station and Space Shuttle Program Control Boards	S, T	Di, R	R			E	Weekly
Daily Space Station Review/Felicity	S, T	Di, R	R			E	Daily/ Weekly
ISS Vehicle/ Avionics Software/Program Integration/Mission Integration and Operations Control Board	S, T	Di, R	R			E	Weekly
ISS Vehicle Systems Integration/Test and Verification Control Panel	S, T	Di, R	R			E	Weekly
Multiflow/Space Allocation Team (M/SAT)	S, T	Di, R	C, Di, R	A, Di	Di	E	Weekly
SSP Flight Template Working Group	S, T	Di, R	R	A, Di	Di	E	Weekly

Legend:
A = Action Item Tracking through Closure
C = Consolidation of meeting presentation inputs into a single agenda based package
De = Development
Di = Distribute
E = Engineering support to present and discuss agenda items
G = Generate and gain approval
R = Reproduction Services
Rc = Recorder Support to formal reviews
S = Schedule
T = Teleconference and Videoconference Support: Schedule, Initiate and Answer

* Frequency of Meeting is approximate and the meetings will be scheduled at the convenience of the Chairs. The meeting schedules and agendas are posted on the respective meeting home page.

2.1.11 Flight Readiness

The contractor shall develop, update and implement a CoFR Plan (DR-12) that demonstrates compliance with NSTS 08117, Requirements and Procedures for Certification of Flight Readiness, and SSP 50108, Certification of Flight Readiness for Space Station. The contractor shall develop and implement an auditable approach to verify and ensure that flight preparation responsibilities and requirements are met and all problems dispositioned. This approach shall

include open item reviews, test readiness reviews, post-test deconfiguration reviews, Payload Endorsement Reviews, Flight Readiness Reviews (FRRs), Prelaunch Mission Management Team (MMT) Reviews, pre-test briefings, and presentation of an integrated CoFR endorsement. The contractor shall prepare and endorse the CoFR in accordance with K-SS-10.5, Kennedy Space Center Payload Processing Certification of Flight Readiness Implementation Plan.

2.1.12 Continuous Improvement

The contractor shall develop, update and implement a Continuous Improvement (CI) Plan (DR-13).

The contractor shall serve as a member of the SSP Flight Production and Templates (JSC 25187) working group and Space Station and Shuttle improvement teams including, but not limited to, JSC SSP RPIT. Current RPIT studies include the Cargo Support System/Cargo PC (CSS/CPC), Load and Go, Payload Ops Support Team (POST), Payload Integration Tool (PIT), payload data products, Cargo Avionics Upgrade (CAU), Avionics Instrumentation Systems (AIS), Pulse Code Modulation Master Unit (PCMMU) upgrade and a Shared Data Repository (SDR).

2.1.13 International Organization for Standardization (ISO) 9001 Compliance

The contractor shall be certified to the requirements of American National Standards Institute (ANSI)/ISO/American Society For Quality (ASQ) Q9001-2000, American National Standard, Quality Management Systems (QMS) – Requirements, and Society of Automotive Engineers (SAE) AS9100, Quality Systems – Aerospace – Model for Quality Assurance in Design, Development, Production, Installation and Servicing by a registrar accredited by the Registrar Accreditation Board (RAB) within 18 months of the effective date of the contract. In the event the contractor's ISO 9001 certification is revoked, the contractor shall notify NASA within five business days. The contractor shall obtain government approval of the scope of certification.

2.1.14 Security

The contractor shall operate a security program in accordance with governing NASA and Department of Defense (DOD) directives. The contractor shall implement payload specific security requirements in support of payload processing operations. The contractor shall develop, update and implement a Security Plan (DR-14).

2.1.15 Emergency Preparedness

The contractor shall develop, update and implement an Emergency Preparedness Plan (DR-15) in compliance with JHB 2000, Consolidated Comprehensive Emergency Management Plan and JDP-KSC-P-3014, Generic Emergency Procedures Document. The plan shall include the contractor's assigned flight hardware, facilities, systems, equipment and operations. The contractor shall plan for and participate in drills and implement their Emergency Preparedness Plan for declared emergencies.

2.2 Business Management

The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance. The contractor shall provide ongoing business

analysis and respond to requests and inquiries from the government relating to budget, schedule, and cost performance. The contractor shall implement, maintain, and update a contract financial system which discretely tracks resources by fund source, mission and project Work Breakdown Structure (WBS) and elements of cost including, but not limited to, labor, overhead, other direct cost, indirect cost, and intra-company work authorizations. The contractor shall develop, update, and maintain a WBS Dictionary (DR-16).

2.2.1 Financial Management

The contractor shall develop, update and implement a financial management process in compliance with Federal Acquisition Regulation (FAR) and NASA FAR Supplement (NFS) financial management policies. The contractor shall provide monthly and quarterly accumulated expenditures and projections of program costs and workforce utilization in accordance with Contract Financial Management Reports (DR-17). The contractor shall manage this contract in a manner that ensures all activities required by this SOW are properly accomplished and accounted for in accordance with all applicable NASA/Federal Government procedures and regulations and guidance provided in DR-17. The contractor shall manage contract resources to maintain the required flexibility to respond to surge, one-of-a-kind, and unforeseen requirements, and shall coordinate with the NASA business office to prioritize such requirements. The contractor shall develop, recommend and implement innovative approaches consistent with government regulations that support and expedite the contract change process.

The contractor shall establish a contract resource management system that will provide the government visibility of cost, schedule, and technical performance for the total contract work activity traceable by Unique Project Numbers (UPN), fund sources to discrete missions, projects and facility utilization. The contractor shall develop and submit, consistent with government budget schedules, financial planning as required to support the government budget process, i.e., multi-year Program Operating Plan (POP) calls, annual operating plan calls, Construction of Facility (CoF) calls, Information Technology (IT) budget calls, Task Agreements, and to support special requests for budget impacts. The format and content of the contractor's inputs and supporting rationale shall be in accordance with the budget or special request guidelines, and formats specified by the government. Based on near- and long-term mission requirements projections provided by NASA, the contractor shall establish, maintain and update an advanced planning tool that identifies resources needed to satisfy these projected mission requirements.

With the termination of the Payload Carrier Program (PCP) and the reallocation of PCP assets to other programs, the contractor shall modify the contract resource management system to provide the government with visibility of cost, schedule, and technical performance traceable by UPNs for the receiving customer programs, i.e., the Expendable Launch Vehicle (ELV) a.k.a. Launch Services Program (LSP), the Shuttle Transportation System (STS), the Department of Defense (DOD), and the KSC Institution. These cost tracking and reporting requirements increased the business management support for activities such as Monthly Business Reviews, 533 financial reporting, and POP budget cycle products.

The contractor shall conduct monthly performance-to-plan reviews to provide the government with insight into the contractor's, subcontractors' and vendors' overall progress. The contractor's planning, tracking and reporting shall include the integration of cost, technical performance, workforce and schedule data for mission processing, facility and support equipment operations and maintenance, facility and support equipment sustaining engineering, launch support/mission operations, logistics operations, energy utilization and consumption, on-

site and off-site headcounts, information technology, any new work requirements, Indefinite Delivery/Indefinite Quantity (IDIQ) tasks, and geographic economic impacts. For any task, activity or project that the contractor has responsibility for that is estimated to exceed predetermined established cost or schedule plans, the contractor shall provide a recovery plan.

2.2.2 Subcontract Management

The contractor shall accomplish the management and technical control of intra-company, subcontractor, and major vendor activities required to fulfill the contract. The contractor shall be accountable for the quality and timeliness of the goods and services that are subcontracted out within the scope of this contract.

The contractor shall provide visibility for the government into all aspects of intra-company, subcontractors, and major vendor activities and shall integrate subcontractor management systems with other required management systems and reporting requirements of the prime contractor. The contractor shall provide performance to plan reports that provide status of progress and performance measurement.

The contractor shall submit procurement documents in accordance with KPD 8710.1, to the designated government quality representative for determination of the need for Government Source Inspection (GSI) prior to release of the procurement. The contractor shall include the following statement on all procurements that require GSI, "The government has the right to inspect any or all of the work included in this order at the supplier’s plant."

2.3 International Travel

The contractor shall coordinate with the government, in advance, all travel to locations outside of the United States by Contractor employees to determine that travel is necessary to the efforts required under the contract and it is otherwise in the best interest of NASA.

3.0 Safety, Mission Assurance, Occupational Safety and Health, and Environmental Compliance

3.0.1 The NASA Safety Hierarchy

The Agency Safety Initiative establishes the NASA safety hierarchy – the order NASA will use to prioritize its safety efforts. The safety hierarchy is:

> First, **safety for the public**. NASA absolutely must protect the public from harm.
>
> Second, **safety for astronauts and pilots**, because they expose themselves to risk in high hazard flight regimes.
>
> Third, **safety for NASA workforce**, because NASA owes it to the workforce to provide them with a safe and healthful workplace.
>
> Fourth, **safety for high-value equipment and property**, because NASA is a steward of the public's trust.

By focusing on the safety of NASA's mission and operations, NASA will improve quality and decrease cost and schedule.

3.0.2 Integrated Safety, Health and Mission Assurance Plan

The contractor shall develop, update and implement an Integrated Safety, Health and Mission Assurance (ISH&MA) plan (DR-18). The contractor shall implement and satisfy the Safety and Mission Assurance tasks, activities and requirements in NPD 8700.1, NASA Policy for Safety and Mission Success.

3.1 Safety

The contractor shall establish and implement a safety program that provides protection from injury or damage due to the contractor’s operations, to members of the general public, personnel, facilities, systems and equipment. The safety program shall comply with federal regulations, NASA and KSC requirements. The contractor shall develop auditable processes to document this program and its associated activities.

The contractor shall reassess and validate all approved safety variances that affect contractor operations. The contractor shall resubmit all validated and contractor approved safety variances to government safety for re-approval within 30 days of contract start.

3.1.1 Payload Ground Safety

The contractor shall participate, as a non-voting member, in the NASA Payload Ground Safety Review process. Participation includes, but is not limited to, the review and documentation of comments on ground safety data packages and attendance at GSRP meetings.

The contractor shall comply with the requirements of a payload's approved ground safety data package.

3.1.2 Systems Safety

The contractor shall develop and implement a process, as documented in the ISH&MA Plan, for the identification, mitigation and control of hazards throughout the complete life cycle (design, development, manufacture, test, operations, maintenance, and disposal) of the facilities, equipment and processes for which the contractor is responsible. The process shall include quantitative or qualitative risk assessments, hazard analyses, and other analytical methods. The contractor shall submit all system safety assessments to NASA Safety for review and approval. The contractor shall select the type of assessment based on the identified level of risk.

The contractor shall develop and update a payload safety engineering assessment (DR-52) for each Space Shuttle mission covering contractor payload operations and equipment.

The contractor shall develop and update the ground portion of the Integrated Cargo Hazard Assessment Report (ICHAR)(DR-19). The contractor shall incorporate the payload safety engineering assessment (DR-52) into the ICHAR.

The contractor shall comply with the NASA Managed Safety Program for Pressure Vessels and Pressure Systems in accordance with NPD 8710.5, NASA Safety Policy for Pressure Vessels and Pressurized Systems.

3.1.3 Operations Safety

The contractor shall develop and implement a process, as documented in the ISH&MA Plan, in which testing, ground operations and maintenance activities are assessed for hazards. The process shall identify how personnel and property will be protected from injury or harm as a result of exposure to these hazards. The process shall provide for hazardous operation surveillance, hazardous procedure review, and risk assessments associated with deviations from procedures or safety and health requirements. The contractor shall document the assessments.

The contractor shall conduct an operations safety assessment on all high risk, first time and out-of-family operations and submit the assessment to NASA Safety for review and approval.

3.1.4 Local Administration of the Data Management System for Payload Safety

The contractor shall provide administration, access control, and data entry for the GSRP portion of the government-provided Data Management System (operated by JSC). Administration includes, but is not limited to:

- Maintaining access control of GSRP members
- Issuing system passwords
- Downloading safety data for distribution
- Uploading status information
- Confirming hard-copy-only safety data is scanned into the system
- Generating and modifying ground related payload safety review status reports

- Coordinating with the JSC system administrator

3.2 Reliability and Maintainability

The contractor shall develop, update and implement a process, as documented in the ISH&MA Plan, which ensures the reliability and maintainability throughout the lifecycle of the facility systems and equipment for which the contractor is responsible. The process shall include assessments of reliability and maintainability performance against baseline allocations; preparation, maintenance, and control of reliability assessments and trend analyses, assessments of materials and parts in support of operational integrity, and evaluation and participation in failure reviews. The contractor's process shall be based on the fundamental Reliability and Maintainability concepts and principles described in NASA-STD-8729.1. The preparation, maintenance, and control of the FMEA/CIL shall be in accordance with the appropriate program requirements; SSP 30234, Failure Modes and Effects Analysis and Critical Items List for Space Station or NSTS 22206, Requirements for Preparation and Approval of Failure Modes and Effects Analysis and Critical Items List. The contractor shall integrate the results of the reliability assessments with the Systems Safety function of risk identification.

The contractor shall participate in the Government Industry Data Exchange Program (GIDEP) and NASA Advisory reporting systems in accordance with NPG 8735.1, Procedure for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program and NASA Advisories.

3.3 Mission Assurance

The contractor shall develop, implement and update a mission assurance plan, as documented in the ISH&MA Plan, which ensures that the performance of the SOW requirements is in accordance with SOW Section 2.1.13 and the sections of SSP 41173, Space Station Quality Assurance Requirements, listed in Table 3-1.

Table 3-1 Applicable Requirements from SSP 41173, Space Station Quality Assurance Requirements

Procurement	Fabrication Control	Test Controls	Nonconforming Articles and Materials	Stamp Controls	Control of NASA and International Partner Property
3.4.2.3	3.5.1	3.6.2	3.7.4.1	3.9.9	3.12.1
3.4.2.4		3.6.2.3	3.7.5.1		3.12.1.1
3.4.4		3.6.2.7	3.7.5.2		3.12.1.2
		3.6.2.8	3.7.5.2.4		3.12.1.3
		3.6.2.9			3.12.1.4
		3.6.2.10			3.12.1.5
		3.6.2.11			3.12.2
		3.6.2.16			
		3.6.3.2			

3.3.1 Mission Assurance Support to Government Led Activities

For government-led tasks for which the government is providing mission assurance, contractor support shall include, but not be limited to:

- Historical documentation archiving and data retention
- Closure in automated tracking systems (All WADs/Technical Operating Procedures [TOPs], including nonconformances)
- Establish and update nonconformance Test, Assembly, and Inspection Record (TAIR) indices
- Closure in TAIR indices
- Add to and update automated nonconformance tracking system database
- Program Problem Reporting and Corrective Action (PRACA) evaluation and reporting
- Provide storage area and control access to storage area for nonconforming articles, including Material Review Board (MRB) items
- Establish and control connect/disconnect logs
- Establish and control temporary installation logs and issue identification tags
- ADP processing
- All mission assurance activities associated with contractor led subtasks

For non-middeck Utilization payloads, the contractor shall perform all mission assurance activities.

3.3.2 Quality Assurance

The contractor shall collect and compile evidence derived from empirical data including, but not limited to, test results, analysis reports, inspection records, and delivery logs to establish that the products and services delivered to the government are in compliance with the requirements and specifications in this contract.

3.3.3 Quality Control

The contractor shall develop, implement and update a process to control and improve the quality of products and services provided under this contract. The contractor shall develop a set of parameters with government concurrence, to be monitored by contractor quality personnel for the measurement and verification of critical processes that control key product characteristics. The measurements shall include, but not be limited to, data on product and service quality, workmanship errors and rework. The process shall be auditable by the government and documented by the contractor. The contractor shall provide Process Control Reports (DR-20).

For those items in the custody of the contractor, the contractor shall generate, update, store and archive an ADP (DR-21) in accordance with SN-D-0007, National Space Transportation System Acceptance Data Package Requirements, SN-S-0008, National Space Transportation System Software Deliverable Data Package Requirements Specification, and SSP 30695, International Space Station Alpha Program Acceptance Data Package Requirements Specification.

The contractor shall identify, report, and resolve nonconformances in accordance with NSTS 08126, National Space Transportation System Problem Reporting and Corrective Action (PRACA) System Requirements; NSTS 08170, Space Shuttle Subsystem Codes; SSP 30223, International Space Station Problem Reporting and Corrective Action (PRACA) System Requirements; SSP 41173, Space Station Quality Assurance Requirements; and SSP 30524 Problem Reporting and Corrective Action Data System Requirements.

The contractor shall create and sustain open communications with employees and subcontractors to identify, report, and resolve nonconformances, problems, and anomalies including close calls.

The contractor shall initiate action, including requesting government approval, to change requirements that are indicated by trending and data analysis to be unreasonable or unnecessary, and to improve processes that result in products or services that fail to meet requirements.

3.4 Software Safety and Assurance

3.4.1 Software Quality Assurance/Engineering

The contractor shall develop, update and implement a software assurance process, as documented in the ISH&MA Plan, in accordance with ISO/IEC 12207, Standard for Information Technology - Software Life Cycle Processes. The contractor shall identify a single point of contact for Software Quality Assurance/Engineering.

The contractor shall evaluate the need for the performance of Independent Verification and Validation (IV&V) testing in accordance with NPD 8730.4, Software Independent Verification/Validation Policy, and provide a determination of applicability to the government.

3.4.2 Software Safety

The contractor shall develop, update and implement a software safety process, as documented in the ISH&MA Plan, in accordance with NASA-STD-8719.13A, Software Safety NASA Technical Standard.

3.5 Occupational Safety and Health

3.5.1 Voluntary Protection Program

The contractor shall submit an application for Voluntary Protection Program (VPP) certification of the safety program to the Occupational Safety and Health Administration (OSHA) within 18 months of contract start. The contractor shall achieve certification within 24 months of contract start.

3.5.2 Mishap Investigating and Reporting

The contractor shall investigate and report mishaps, in accordance with NPR 8621.1A, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping, and KNPR 8715.3, KSC Safety Practices Procedural Requirements. All investigation reports shall include a human factors assessment, root cause analysis and any remedial/corrective actions performed.

The contractor shall develop and implement a call tree with government and payload customer contacts for the reporting of a mishap, near-miss incident, equipment problem or a system going out of specification. The contractor shall report incidents and problems within four hours of the occurrence.

The contractor shall provide summary data on mishaps (DR-22).

3.5.3 Lessons Learned

The contractor shall develop, update and implement a process, as documented in the ISH&MA Plan, to capture, disseminate, and implement lessons learned, both positive and negative, in accordance with NPR 8621.1A, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping, and NPG 7120.5, NASA Program and Project Management Processes and Requirements. The contractor shall enter the lessons learned into the government provided Lessons Learned Information System operated by the Goddard Space Flight Center (GSFC).

3.5.4 Industrial Hygiene

The contractor shall develop, update and implement an industrial hygiene process, as documented in the ISH&MA Plan, in accordance with the requirements of NPG 1820.1, Hearing Conservation, KHB 1840.1, Industrial Hygiene Handbook, KHB 1820.3, KSC Hearing Loss Prevention Program, and KHB 1820.4, KSC Respirator Protection Program.

3.5.5 Health Physics

The contractor shall develop, update and implement a health physics process, as documented in the ISH&MA Plan, in accordance with the requirements of KMI 1860.1, KSC Radiation Protection Program, KHB 1860.1, KSC Ionizing Radiation Protection Program, KHB 1860.2, KSC Non-Ionizing Radiation Protection Program, and the requirements of the Nuclear Regulatory Commission.

3.6 Environmental Compliance

The contractor shall develop, update and implement an environmental compliance process in accordance with KMI 8800.8, KSC Environmental Management and KHB 8800.6, KSC Environmental Control Handbook (DR-23). The contractor shall handle all waste streams generated by their processes in accordance with KHB 8800.7, Waste Management Handbook.

The contractor shall apply for and maintain all necessary permits required by federal, state or local rules and regulations. Permits shall be submitted through the NASA/KSC Environmental Program Office.

4.0 Payload Processing & Integration

Payloads include, but are not limited to, ISS elements, MPLM, Shuttle payloads, SPACEHAB Module, Hitchhikers, Get-Away Special (GAS) canisters, ELV payloads, satellites, external carriers, middeck payloads, experiments, and pallet carriers with special Research and Development (R&D) instruments.

The contractor shall perform payload processing, including but not limited to, planning, scheduling, test, operations, preparation for flight, Shuttle integration, launch operations, mission support, post landing and mission equipment return based on requirements documents.

The contractor shall maintain, operate, configure, deconfigure, integrate, deintegrate, implement modifications, and refurbish hardware listed in Appendix 2.

For assigned payloads, the contractor shall partner with the payload developer to develop integration and test requirements. The contractor shall implement the final integration and test requirements to conduct test operations including, but not limited to:

- Physical integration and de-integration
- Interface and verification testing
- Fluid servicing

The contractor shall provide closed-loop traceability denoting OMRS, ACOMC, TGHR, Chit, LOLI and time cycle requirement satisfaction from the implementing document back to the source requirement per Section 2.1.8.

The contractor shall prepare, update, and provide performance-to-plan and open item status reports for pre-test briefings and pre-test reviews.

Prior to deconfiguring a test setup, the contractor shall conduct post-test reviews, decable reviews, analysis of test and operations data, and briefings.

The contractor shall develop, update and implement technical processes and products including:

- Mission Unique Drawings (MUDs), Mission Interface Diagrams (MIDs) and Mission Integration Schematics (MISs)
- WADs
- Schedules for planning and traceability of implementation (per Section 2.1.3)
- Problem Reports (PRs)
- Test application software

The contractor shall repair, fabricate and implement approved flight and ground equipment (including cabling and connections) configuration changes to, but not limited to:

- Mechanical systems
- Electrical Power systems
- Command and Data Handling systems
- Avionics systems

- Fluids systems
- Pressure shells
- Primary and secondary structures
- Multi-Layered Insulation (MLI)
- Fiber Optics

4.1 Advanced Planning

The contractor shall perform advanced planning activities. Advanced planning begins as soon as the government approves the payload for flight assessment.

The contractor shall develop and update an element/mission planning milestones schedule that identifies advanced planning activities including, but not limited to, formal meetings (as listed in Section 2.1.10), LSSP development, and project milestones such as Preliminary Design Review (PDR)/Critical Design Review (CDR) and the GOR. The contractor shall update the schedule as milestone dates change. The contractor shall publish a report for the weekly management operations meeting as detailed in Section 2.1.10.

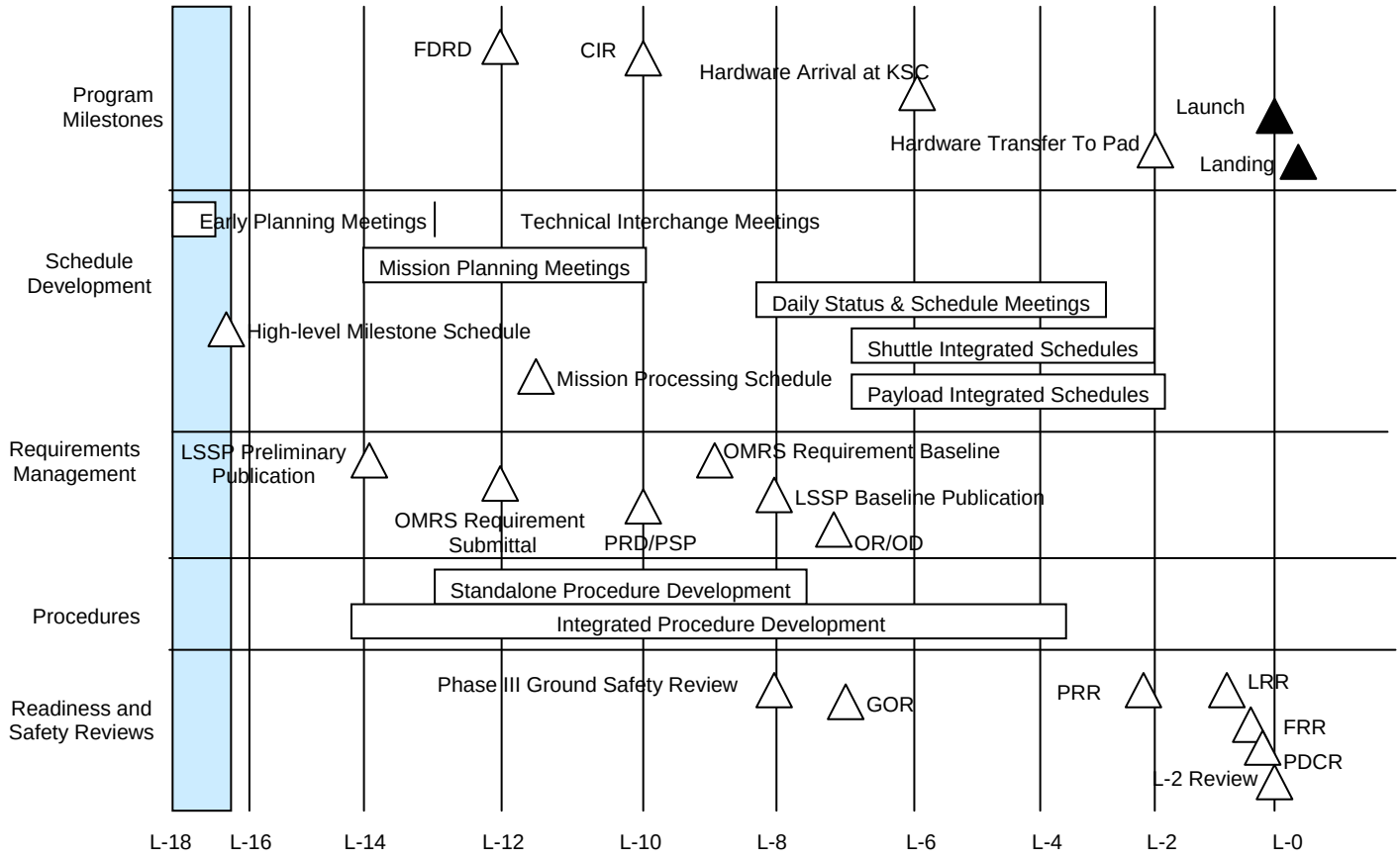
At early planning meetings, as listed in Section 2.1.10, the contractor shall, as a minimum:

- Identify cost and schedule processing impacts affecting KSC
- Identify and document top-level payload flow schedule templates, for each mission, that impact launch site policies, capabilities and cost
- Identify KSC owned equipment and processes that may contribute to payload customer and government cost saving and enhance mission success
- Identify and propose resolution to facility and GSE utilization conflicts
- Identify and document payload customer support and technical requirements
- Identify and propose resolution to potential ground systems and flight hardware and software processing issues and concerns
- Identify and propose resolution to payload access and interference analysis
- Compare new payload customer support and technical requirements with other missions and flows and identify any existing or potential conflicts

The contractor shall conduct LCC analysis during the early payload design cycle discussion and development process (preliminary requirement review, PDR, CDR) and provide guidance to the payload developer. The contractor shall conduct an analysis of the LCC change notices per KDP-P-1087, Launch Commit Criteria (LCC) Development.

Figure 4-1 illustrates a representative advanced planning template from L-18 months through L+2 months is generic for Shuttle/ISS payloads and should be used as a guide only.

Figure 4-1 Advanced Planning Guide



4.1.1 Ground Operations Planning

The contractor shall develop a mission communication plan that describes the advanced planning team and mission processing team roles, responsibilities and interfaces (DR-24).

4.1.2 Customer Support

The contractor shall provide payload customers with launch site policies, requirements, and capabilities (DR-25), no later than the first formal meeting with the customer.

The contractor shall conduct an internal KSC review of payload customer procedures in accordance with KDP-P-1065, Review of Customer Procedures and Contractor Developed Operations and Maintenance Instructions (OMIs) and Test Preparation Sheets (TPSs).

The contractor shall prepare and update a transportation plan for each shuttle and ELV payload to include the payload and GSE transportation requirements, as documented in the LSSP.

The contractor shall assist the payload customer in preparation of customer unique plans, including the emergency preparedness plan, and any unique contamination control plans.

4.1.3 Customer Agreements

4.1.3.1 Launch Site Support Plan

The contractor shall gather launch site support requirements from the payload customer and develop the payload LSSP for government approval per KDP-P-2835, ISS/Payload Processing Launch Site Support Plan Development. The contractor shall develop a LSSP per a government and contractor agreed-to planning template and ensure the LSSP is in agreement with the associated Mission Integration Plan (MIP), Payload Integration Plan (PIP) or Carrier Integration Plan (CIP). The LSSP includes payload customer requirements, agreements, and processing flows.

The contractor shall identify support capability issues with the preliminary LSSP and propose solutions. The contractor shall integrate the requirements with other missions and flows and identify any existing or potential conflicts.

The contractor shall develop support capability data and cost estimates in response to the launch site support requirements accepted by the government.

The contractor shall obtain approval by the payload customer and government, release and publish the baseline LSSPs.

4.1.3.2 Bilateral Plans and Agreements

The contractor shall provide technical inputs, cost and schedule impacts and resolutions involving KSC payload processing to NASA for all bilateral plans and agreements between NASA and its International Partners/Participants. The contractor shall document relevant

payload processing agreements in the associated LSSP. The current bilateral agreements and plans are listed in Appendix 3.

4.1.4 Customer Support Requirements

The contractor shall coordinate LSSP support requirements with affected supplier organizations, provide traceability and shall ensure that these support requirements are satisfied.

The contractor shall comply with JSC-27379, Space Shuttle/ISS Support Requirements System Management Plan, by utilizing the Automated Support Requirements System (ASRS) to document the requirements for each mission and payload. The contractor shall update and maintain the applicable payload databases in the ASRS per the guidelines documented in KSC-HB-GP60-3, ASRS Handbook and publish the support requirements documentation (DR-26).

4.2 Launch Site Services

Launch site services are defined as the contractor services provided to the payload customer(s). These include facility infrastructure, power, fluids and gases, clean rooms, labs, transportation, logistics, and crane operations. The required services are identified by the payload customer and the government through the MIP, PIP, CIP and LSSP. The contractor shall obtain government and payload customer approval of additional requirements and real-time requests for additional services prior to implementation.

Table 4-1 represents the services typically required to process each “class” of payload. The contractor shall perform any launch site services listed in Table 4-1 per approved requirements and manifests (Appendix 4).

Table 4-1 Launch Site Services

LAUNCH SITE SERVICES	ELV	Mid-decks	GAS/ Hitchhikers	ISS Elements	Commercial Carriers	Other Shuttle Payloads	Utilization
TRANSPORTATION SERVICES							
Load/offload coordination, transport to the assigned PPF and required services at KSC point of entry	X	X	X	X	X	X	X
Clean vehicle and shipping container before clean work area entry	X	X	X	X	X	X	X
Transport payload and GSE between KSC and/or Cape Canaveral Air Force Station (CCAFS) facilities	X	X	X	X	X	X	X
Prepare payload and GSE for departure from KSC and CCAFS		X	X	X	X	X	X
Coordinate aircraft/ship/truck fueling for payload and GSE arrival/departure	X		X	X	X	X	X
Perform canister rotations in the Canister Rotation Facility (CRF) and/or Vehicle Assembly Building (VAB)			X	X	X	X	
FLIGHT HARDWARE HANDLING							
Perform crane operations in the PPFs	X		X	X	X	X	X
Relocate payloads, GSE, shipping containers, and access stands hardware within PPFs	X	X	X	X	X	X	X
Provide payload customer training for facility access, pendant crane operations, and unique facility capability	X	X	X	X	X	X	X
PAYLOAD PROCESSING SUPPORT							
Provide and operate GSE, facility systems and equipment per approved ICDs, drawings, requirements	X	X	X	X	X	X	X
Provide access equipment and stands	X	X	X	X	X	X	X
Provide PPF and Lab clean room environment per K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements/Plan	X	X	X	X	X	X	X
Provide 10K clean work area	X	X	X		X	X	X
Laboratory space in the O&C and SSPF		X	X	X	X	X	X
Set up payload customer Payload Operations Control Center (POCC) at KSC	X				X	X	X
Set up and configuration of control rooms to support tests	X	X	X	X	X	X	X
Handling, delivery, procurement coordination and provision of propellants, liquids, and gases	X	X	X	X	X	X	X
Provide standard and digital photographic and video services		X	X	X	X	X	X
Materials sampling and analysis services including solids, fluids and gases per Section 7.2.1	X	X	X	X	X	X	X
Coordinate, assemble, control, handle ordnance (Receiving inspection, storage, bridge-wire checks, leak tests, x-rays)	X		X		X	X	X
Hazardous fluids/gas servicing	X			X	X	X	X
Radiological source storage and coordination of institutional services with other contractors and government agencies	X	X			X	X	
Command and monitor payload via the T-0 interface			X	X	X	X	X
Receive, prepare, load and verify load of payload flight software on flight and GSE components.				X	X	X	X
Storage, transportation, activation, charging and conditioning of payload batteries.		X	X	X	X	X	X

LAUNCH SITE SERVICES	ELV	Mid-decks	GAS/ Hitchhikers	ISS Elements	Commercial Carriers	Other Shuttle Payloads	Utilization
Operate payload spin table	X					X	
Electromagnetic measurement and analysis services	X	X	X	X	X	X	X
Component cleaning including flex hoses, servicing cart (down to 100A), gauges, and valves	X	X	X	X	X	X	X
LOGISTICS							
Provide shop support for failure analysis, alignment table, fabrication/repair of payload customer flight/GSE hardware	X	X	X	X	X	X	X
Provide shipping and receiving services	X	X	X	X	X	X	X
Provide bench stock consumables items such as plastics, foams, adhesives, wipes, and cleaning materials	X	X	X	X	X	X	X
Issue loan-pool equipment including tools, headsets, and clean-room/anti-static/protective garments	X	X	X	X	X	X	X
Facilitate payload customer interface with U.S. Customs		X	X	X	X	X	X
Storage for shipping containers, GSE, and flight hardware (subject to availability)	X	X	X	X	X	X	X
ADMINISTRATIVE AND INSTITUTIONAL SUPPORT							
Provide office and laboratory space with access to telephone, video conferencing, FAX machines, computers connectivity, mail and reproduction services	X	X	X	X	X	X	X
Escort payload customers (including foreign nationals) without unescorted access within restricted facilities		X	X	X	X	X	X
Provide security services such as access stand monitor, guard shack coordination, and hazardous materials security	X	X	X	X	X	X	X
Hazardous waste accumulation area setup in PPFs and disposal coordination with J-BOSC	X	X	X	X	X	X	X

The contractor shall schedule, perform, and provide pre-integration activities and launch site services for ISS, Shuttle, and ELV payloads per approved requirements and manifests listed in Appendix 4.
The contractor shall perform unique services for the Japanese Experiment Module (JEM) per approved requirements.

4.3 Payload Integration

The contractor shall schedule and perform integration activities including, but not limited to, assembly, buildup, integration, fit checks, test, servicing, closeouts, alignment checks, payload envelope checks, weight and Center of Gravity (CG) determination, maintenance, handling and de-integration for assigned manifested payloads listed in Appendix 4, in accordance with approved requirements.

4.3.1 ISS Elements

The contractor shall perform the integration activities for all ISS elements per approved requirements and manifests listed in Appendix 4, including, but not limited to:

- MLI and debris shield installation
- Ammonia servicing
- Internal Thermal Control System (ITCS) water production and servicing
- Space Vision System (SVS) targets survey and installations

The contractor shall perform the integration activities for all ISS elements per approved requirements and manifests listed in Appendix 4, including, but not limited to:

- MLI and debris shield installation
- Ammonia servicing
- Internal Thermal Control System (ITCS) water production and servicing
- Space Vision System (SVS) targets survey and installations

The contractor shall perform battery reconditioning and Orbital Rate Capacity Testing (ORCT) for the 12A and 13A truss elements.

The contractor shall perform support tasks associated with the replacement of batteries on the P4 cargo element prior to launch per approved requirements. These activities shall include an additional ammonia operation for 12A, extended shift support for SSPF high bay and instrument library, and imagery support to capture and document the removal and replacement of the P4 batteries and solar array wings, closeouts and final configuration activities.

4.3.1.1 Node Processing

The contractor shall perform Node processing per approved requirements.

The contractor shall develop a list of GSE (including Alenia hardware) required for Node processing activities. The contractor shall perform validation and operation of Node GSE.

The contractor shall provide data monitoring, data processing and commanding capabilities for Node processing. The contractor shall develop and produce ground software displays based on Standard Out and NASA supplied requirements.

The contractor shall provide and configure flight hardware and GSE for the On Orbit Constraints Test (OOCT), the Node Systems Tests (including IST), and Multiple Element Integrated Testing (MEIT) per approved requirements (Ref. 4.4 Payload Testing)**.**

The contractor shall perform Node 2 assembly and integration work, per approved requirements, that was originally planned to be performed prior to shipment to KSC. The contractor shall perform removal, reinstallation and retest of the Node 2 Remote Power Control Module (RPCM).

The contractor shall perform special testing and tasks on Node 2 per approved requirements. The contractor will perform a series of simple tasks and tests that will not change form, fit or function of the Node 2 element.

The contractor shall perform 13 additional tasks for Node 2 processing to incorporate program design changes, design integration, problem report corrections, and maintenance activities.

The contractor shall perform Node 2 bulkhead modifications for each of the six Node 2 hatches (forward, aft, and four radial). The contractor will be responsible for procedure development and implementation of the modifications to enlarge the Node 2 bulkhead pockets to accommodate the hatch pawl pin in order to prevent overloading of the hatch latch mechanism and hatch link failure. The contractor shall re-modify the six Node 2 bulkhead hatch pockets to updated engineering requirements and repair the radial hatch seal inserts.

The contractor shall perform removal and installation of common hatches from the Node 2 element. The contractor is authorized to use Node 3 hatches as replacement hatches on the Node 2 elements.

The contractor shall perform Node 3 advanced planning, processing, and support Node 3 testing per approved requirements. The contractor shall perform additional tasks including reviews, planning, scheduling, and support requirements development. The contractor will be responsible for the development of all GSE and Test Support Equipment and accompanying documentation and procedures required by the contractor in Node 3 processing and testing.

The contractor shall provide host support to Alenia in the removal of the closeout panels on the Node 2 element that will enable access to solve interference issues between the seals of the Node 2 closeout panels and the radial hatches. Other host support tasks include WAD development and closure, element rotations and floor installations, laser measurements to verify modifications corrected the interference, and re-phase of the baseline to accommodate the new work.

4.3.1.2 Multi-Purpose Logistics Module

The contractor shall manage and perform prelaunch and turnaround MPLM processing, maintenance, and refurbishment.

The contractor shall develop, update and implement a MPLM Ground Processing Plan (DR-27).

The contractor shall perform removal and installation of common hatches from MPLM elements. The contractor is authorized to use Node 3 hatches as replacement hatches on the MPLM elements.

The contractor shall perform non-destructive evaluation and inspection of weld locations (radial, circumferential, and longitudinal) on MPLM flight modules 1 and 2 per approved requirements.

The contractor shall perform thermostat modifications to insulate the thermostat leads from the multi-layer insulation and to prevent future occurrences.

4.3.1.2.1 MPLM Cargo Integration

The contractor shall receive flight ready stowage subassemblies (e.g. soft-pack bags, drawers, and trays) from the SFOC, International Partners, the science community, the government, and other ISS Program participants and integrate the subassemblies into the appropriate carrier system (Resupply Stowage Rack [RSR], Resupply Stowage Platform [RSP], or other rack type). The contractor shall integrate all manifested cargo into the MPLM in accordance with ISSP requirements. Installation of Utilization subassemblies on dedicated Utilization racks will be the responsibility of the government. The contractor shall perform late stowage following rack installation in the SSPF and at the pad per approved mission requirements.

The contractor shall perform early access operations at the Primary Landing Site (PLS) and Secondary Landing Site (SLS) per approved mission requirements.
Upon return to the SSPF, the contractor shall de-integrate racks from the MPLM, subassemblies from the racks, and provide the subassemblies to the SFOC contractor and the government. The contractor shall return unopened ISS trash containers to SFOC. The contractor shall plan and implement provisions to clean up any cargo-related spills or leakage in the MPLM

4.3.1.3 Cupola Processing

The contractor shall perform Cupola processing per approved requirements.

4.3.2 Non-ISS Payloads

The contractor shall schedule and perform integration activities including, but not limited to, payload integration, fit checks, test, servicing, handling and de-integration for assigned manifested payloads listed in Appendix 4 in accordance with approved requirements.

4.3.3 Utilization Payloads

This section delineates the government and contractor responsibilities for processing Utilization Payloads as defined in the SOW Dictionary. The government will identify Utilization Payloads prior to hardware arrival at KSC. Due to the specialized nature of certain engineering and payload customer requirements, the payload customer or government personnel may perform a limited amount of actual “hands-on” work, including, but not limited to, post-landing middeck support.

The contractor shall perform functions identified in the contractor responsibility column in Table 4-2.

Table 4-2 Utilization Contractor and Government Responsibilities

Function	Government Responsibility	Contractor Responsibility
Approval authority for agreements with Utilization Payload customers	Agreement approval	N/A
Safety and Mission Assurance	Per Section 3.0	Per Section 3.0
Scheduling and planning	• Provide schedule input • Develop internal schedules • Resolve conflicts and impacts	• Provide access to scheduling process • Integrate and coordinate the government input into scheduling process • Identify conflicts and impacts
Systems engineering • Develop WADs • Perform hardware integration, deintegration, servicing (includes late and early access), weight and CG determination for middeck payloads, and stand-alone and integrated testing • Technical interface with Utilization Payload customers • CoFR for Utilization Payloads at reviews involving that hardware • Requirements evaluation and input	Provide	N/A
Documentation production and release per Section 2.1.6	N/A	Perform
Launch Site services per Section 4.2*	N/A	Perform
Configuration management, operation and maintenance of assigned systems and support equipment	N/A	Per Sections 2.1.4, 5.2, 5.3 and Appendices 5A, 5B, 13 and 14
Sustaining engineering of assigned systems and support equipment.	Per Section 5.3 and Appendices 5A and 14	Per Sections 5.2 and 5.3 and Appendices 5B, 13 and 14
Configuration management of Utilization Payload flight hardware per Section 2.1.4	User and input	Perform
Technicians	N/A	Provide
Logistics support including, but not limited to bonded storage, hardware tracking, kitting, packaging, handling, storage and transportation per Section 7.0	N/A	Perform
Closed loop requirement tracking per Section 2.1.8	Provide input	Provide and operate system
Open item status report maintenance	Provide input	Provide and operate system
Non-conformances and WAD development processes	User privileges	Provide read and write access
Training for government personnel per Section 8.1	Certification if required	Provide
Mid-deck pre-launch and post landing payload processing	Systems engineering	Pre-launch handling and transportation support only

*Launch site services shall be provided to the government per schedule input.

4.3.4 Commercial Carriers

The commercial carrier provider will accomplish all cargo integration functions and transport the integrated carrier to the PPF. The cargo provider will be responsible for late stowage and early sample removal.

The contractor shall provide launch site processing services including, but not limited to, payload offloading, transportation between facilities, Multi-Mission Support Equipment (MMSE) canister operations, Spacelab tunnel configuration, orbiter installation, post-landing de-integration from the orbiter and MMSE Transportation to the PPF as required.

4.3.5 External Carriers

The contractor shall manage, and perform external carriers processing, maintenance and refurbishment with the exception of Utilization and experiment integration activities as defined in section 4.3.3.

4.3.5.1 Partial Payloads

The contractor shall manage and integrate partial payload processing activities with the exception of Utilization activities identified in Section 4.3.3.

The contractor shall process all configurations of the partial payload carrier and subsystems including, but not limited to:

- Hardware Integration
- Subsystem servicing and checkout
- MLI installation
- Subsystem deservicing
- Hardware deintegration
- Refurbishment and reconfiguration for subsequent flights

4.3.6 Fluids and Gasses Servicing

The contractor shall perform fluids and gasses servicing for Shuttle, ISS and ELV payloads per approved requirements.

4.3.6.1 High Pressure Gas Servicing

Gases for high pressure servicing include hydrogen, oxygen, nitrogen, helium, and other high-pressure gases.

The contractor shall perform high pressure gas servicing for payloads in compliance with approved requirements and applicable safety standards for mitigating risk to personnel, flight hardware and GSE. The contractor shall be responsible for the overall planning, procedures, safety, emergency planning, security, facility support, GSE setup and breakdown, flight hardware handling, leak checks, servicing, launch configuration closeouts and integration of high pressure gas tanks on the payload carrier.

4.3.6.2 Hazardous Fluids Servicing

The contractor shall perform hazardous fluids servicing for payloads in compliance with approved requirements and applicable safety standards for mitigating risk to personnel, flight hardware and GSE. The contractor shall be responsible for the overall planning, procedures, safety, emergency planning, security, facility support, GSE setup and breakdown, flight hardware handling, leak checks, servicing, contingency operations (including, but not limited to spill cleanup), launch configuration closeouts and integration.

Hazardous servicing includes, but is not limited to, the following fluids:

- Ammonia (NH_3)
- Hydrazine (N_2H_4)
- Monomethylhydrazine (MMH)
- Unsymmetrical dimethylhydrazine (UDMH)
- Nitrogen Tetroxide (N_2O_4)
- JP8/RP1
- Hydrogen Peroxide (H_2O_2)
- Cryogens (LN_2, LO_2 and LH_2)

4.3.7 Vehicle Integration Test Office Support

The contractor shall ensure all Vehicle Integration Test Office (VITO) activities are integrated into the processing schedules. The contractor shall provide and configure GSE and Flight Support Equipment (FSE) to support VITO activities. The contractor shall resolve all VITO discrepancies for which they have responsibility.

4.4 Payload Testing

The contractor shall perform payload testing per approved requirements. The contractor shall develop and implement test plans and procedures.

Tests include, but are not limited to:

- EMC (Reference Sections 4.4.2 and 8.2.1)
- Leak Test (Reference Section 4.4.3)
- Post Delivery Verification Testing (PDVT) (Reference Appendix 1A)
- CITE and Orbiter Interface Verification Test (IVT) and End-to-End (ETE) (Reference Section 4.7.1)
- Flight Load Verification (Reference Section 4.7.1)
- Launch Sims (Reference Section 4.7.1)
- Combined Systems Tests: Mission Sequence Test (MST) and Integrated Compatibility Test (ICT) (Reference Appendix 1A)
- Subsystems Testing (Reference Appendix 1A)
- Crew Equipment Interface Test (CEIT) (Reference Section 4.4.1)

The contractor shall perform all testing responsibilities designated by an “X” in Table 4-3. A description of each test can be found in Appendix 1A, Glossary. Table 4-3 lists the expected testing responsibilities for each type of test. The government will be the task leader for the MEIT, IST, Node System Tests (Reference Appendix 1A), and Utilization tests.

Table 4-3 Test Function Responsibilities

Function	Test Leader			
	NASA		Payload Customer	CAPPS
	Node System Tests, IST & MEIT	Utilization Testing	On Orbit Constraints Test	CAPPS Managed Testing
Planning				
Review and comment on test concepts, groundrules, plans and justification	X	X	X	X
Requirements				
Review and comment on payload developer and program test requirements	X	X		X
Concur with test requirements				X
Provide traceability from implementing WAD back to the source requirement (Ref. 2.1.8)	X	X		X
Procedures (Reference Section 2.1.6)				
Develop and update the pre-ops, post-ops, staging and test site procedures for flight hardware (per assigned payload)	X			X
Develop and integrate test procedures				X
Collect, prepare, publish, distribute, and maintain test procedures	X	X		X
Review, redline and concur on test procedures	X	X	X	X
Approve procedures		X(1)		X
Program & Payload Provider Flight Hardware & Software				
Identify need, coordinate shipping, track delivery	X			X
Provide and maintain Deliverable Items Sheets	X			X
Configure test setup; activate and maintain test site	X	X	X	X
Operate flight hardware	X(2)	X		X
Schedules				
Create, plan testing timelines; conduct reviews with NASA and others				X
Review, comment and concur	X	X		X
Publish test timelines and actual durations	X	X		X
Archive planned and actual test timelines	X	X		X

Function	Test Leader			
	NASA		Payload Customer	CAPPS
	Node System Tests, IST & MEIT	Utilization Testing	On Orbit Constraints Test	CAPPS Managed Testing
Schematics, Drawings, & Diagrams				
Develop, publish and update test schematics, drawings, and diagrams (including, but not limited to MUDs, MIDs and MISs)	X			X
Conduct engineering and operations reviews with NASA and others	X			X
Emulators, GSE & Checkout Systems				
Develop, acquire, configure, stage, operate and maintain - Perform software loads and diagnostic testing - Create displays, applications, scripts and databases - Provide monitoring and commanding - Detect, track, isolate and resolve anomalies	X	X[(3)]	X	X
Develop, integrate, and update pre-ops, post-ops, staging, and test site procedures	X	X		X
Perform GSE-to-flight hardware connection and disconnection (per government and payload customer agreement)	X			X
Testing				
Manage and conduct	X[(4)]			X
Provide Safety, Quality Assurance (QA) and Quality Engineering (QE) support per section 3.0	X	X	X	X
Detect, track, isolate, resolve anomalies and close paper				X

[(1)] Mission Assurance approval only, not Engineering
[(2)] Limited to command and telemetry interface to flight hardware (e.g. PCS, Mate, RWS).
[(3)] Utilization emulators are operated and maintained by the government
[(4)] Provide On-Console direction of Test Operations and Emergency Response

4.4.1 Crew Equipment Interface Test

The requirements for CEIT are developed jointly by the KSC and JSC VITO and are documented in a VITO memorandum. These requirements will be contained in the MIP, PIP, or CIP for each payload or ISS element.

For assigned flight hardware, the contractor shall configure the flight hardware in a near launch configuration per documented requirements. The contractor shall provide and configure GSE and FSE to support the test. Following the test, the contractor shall reconfigure the assigned flight hardware to a pretest condition as applicable. The contractor shall document and disposition the CEIT anomalies that affect the hardware for which the contractor has responsibility. The contractor shall perform payload and ISS CEITs in the PPFs, SFOC will lead CEITs in the Orbiter.

4.4.2 Electromagnetic Compatibility Testing

The contractor shall develop procedures and perform EMC testing for ISS payloads and ISS elements to satisfy approved requirements. EMC testing for ISS elements will be performed in accordance with SSP 30238, Space Station Electromagnetic Techniques and SSP 30237, Space Station Electromagnetic Emission and Susceptibility Requirements referenced in Section 8.2.1.

4.4.3 Component Level and Gross Leak Test

The contractor shall provide overall planning and execution of leak tests including component level and gross leak tests for all assigned pressurized elements including, but not limited to MPLMs, Nodes, Cupola and the European Space Agency (ESA) Columbus Orbiting Facility (COF) per approved requirements.

The contractor shall provide all materials, components and consumables necessary to prepare and conduct each test including, but not limited to:

- Air and gaseous helium K bottles per SSP 30573, ISS Fluid Procurement and Use Control Specification
- High-pressure gas panels
- Valves, fittings, tubing, flex-hoses, feed-throughs, filters, gauges, pressure transducers
- Flight interface hardware

The contractor shall review and provide comments to IP/P provided leak test procedures.

The contractor shall configure the test article for leak tests and reconfigure the test article following the completion of test for assigned flight hardware.

The contractor shall perform component level leak tests and gross leak tests as close to launch as practical.

The contractor shall perform leak detection and isolation techniques to resolve anomalies with flight hardware and GSE.

The payload developers will conduct the gross leak checks of Japanese Experiment Module-Pressurized Module (JEM-PM), JEM External Logistics Module-Pressurized Section (ELM-PS) and Russian Space Agency (RSA) Science Power Platform at KSC.

4.4.4 (Reserved)

4.4.5 (Reserved)

4.4.6 Forum Participation for Support to Government Testing

The contractor shall participate in government led test team forums, including but not limited to, ITRG TIMs and test processing team meetings. The contractor's participation includes, but is not limited to:

- Project and technical comments to products and processes developed by the government, International Partners and other team members
- Presentation including present status and future planning of the contractor required products and processes
- Review other team member comments and update of contractor products and processes
- Program Management Review (PMR), shift turnover review and anomaly review

The contractor shall schedule and provide Section 4.2 Launch Site Support services in support of government led testing.

4.4.7 Alpha Magnetic Spectrometer Functional Interface Test

The contractor shall provide testing support to the Alpha Magnetic Spectrometer Functional Interface Test (FIT). The contractor is responsible to sustain, maintain, and operate the Cargo Integrated Test Equipment (CITE) and Payload Test and Checkout System (PTCS). The contractor shall perform a simulated risk mitigation FIT test to verify:

- Alpha Magnetic Spectrometer (AMS-02) Command and Data Handling (C&DH) hardware and software
- AMS-02 C&DH interface communication paths of the ground segment to the ISS PTCS and Space Shuttle CITE
- Relationships to the Payload Operations Integration Facility (POIF) Payload Data Service System (PDSS) at the Kennedy Space Center

4.5 Shuttle Integration

The contractor shall coordinate payload customer requirements with the SFOC contractor.

The contractor shall conduct shuttle to payload integration tasks including:

- Payload access control monitoring at the pad and OPF
- Payload specific pad, OPF, Mobile Launch Platform (MLP) and VAB operations
- Launch on Need (LON) activities (Reference Section 4.6)
- Late and early access assessments and execution
- Problem identification, documentation, tracking and resolution
- Canister operations
- Orbiter interface connects and disconnects in coordination with SFOC

The contractor shall develop procedures, setup and activate payload GSE including payload customer-provided equipment. The contractor shall schedule payload activities and perform the specified testing after installation.

4.6 Launch On Need

LON is a process to have all activities preplanned in the event an ISS critical spare is required on ISS and manifested late in a flow for a possible change out of an experiment or Orbital Replacement Unit (ORU) for an ISS critical spare.

The contractor shall develop and update a LON Ground Processing Plan (DR-28) and shall coordinate and implement the plan with the SFOC contractor.

The contractor shall perform drawing development and factory equipment verification in support of LON efforts.

As part of the preplanning activities, the contractor shall perform three-dimensional modeling simulations as defined in Section 6.1.6 for LON missions. The contractor shall perform three-dimensional simulations for each LON mission (reference Appendix 4A) to assess ORU, FSE, and Carrier integration and deintegration.

4.6.1 ORU Servicing for Flight Spares

The contractor shall perform ORU servicing per approved requirements for spares prior to flight. The contractor shall provide technical expertise for requirements development and develop procedures required for ORU servicing activities including ORU inspections, functional testing, fluid fills, and Electronically Erasable Programmable Read-Only Memory (EEPROM) refresh. The contractor shall develop engineering drawings for hazardous procedures. The contractor shall identify new support equipment or modifications to existing equipment in support of ORU servicing per approved requirements. The contractor shall provide input into safety assessments.

4.7 Payload Launch and Landing Operations

4.7.1 Orbiter and Pad Operations

The contractor shall integrate payload requirements and activities with the SFOC contractor for Launch Complex 39 operations, including the delivery of payload mission unique equipment. The SFOC has overall responsibility for installation of the payload into the orbiter, AFD equipment and other orbiter-specific FSE into the orbiter.

The contractor shall perform electrical interface pre-connection tests for payloads to orbiter direct and T-0 umbilical from MLP Compartment 10A to the orbiter.

The contractor shall perform interface testing. The contractor shall conduct payload to orbiter integration, IVT, and ETE testing tasks including:

- Test planning
- WADs and schedules development

- Launch Processing System (LPS) data processing application software and data displays development and delivery to SFOC
- Shuttle Data Tape (SDT) and Payload Data Tape (PDT) integration
- Payload Test Configuration Identifier (TCID) build-up and delivery to SFOC
- Payload and Launch Control Center C1 console configuration
- SFOC delivery products coordination and negotiation
- Mission unique equipment and software installation
- SSP payload flight software Telemetry Format Load (TFL) /Downlist Format Load (DFL) format checks verification
- Load check of software on LPS
- Tracking Data Relay Satellite (TDRS) usage coordination for ETE testing
- PC Goal Software and displays configuration and validation
- SSPF Customer Management Room (CMR) and Launch Control Center Firing Room 2 payload console configuration

The contractor shall develop and coordinate launch countdown simulations, scenarios, schedules, procedure, and problem conditions with SFOC.

The contractor shall certify personnel required to participate in launch countdown operations.

The contractor shall create LCC flow charts, contingency plans and procedures to satisfy the approved LCC requirements.

4.7.2 Late Access

The contractor shall provide and maintain the capability to access payload carriers, commercial carriers and the MPLM in the orbiter at the pad.

The contractor shall load conditioned cargo into the MPLM ISS refrigerator/freezers within seven days of scheduled launch. The contractor shall provide electrical power and command and data services to the active MPLM via T-0 umbilical on a continuous basis during the refrigerator/freezer conditioning, loading, and countdown operations (minimum seven days). The contractor shall perform late pad operations and stowage in coordination with the SFOC.

4.7.3 Launch Operations

The contractor shall:

- Create the Launch Control Center C1 console seating arrangements and charts for approval by the government
- Develop the payload sections of the launch countdown procedures
- Execute the procedures
- Load and verify Launch Control Center C1 console applications software and displays
- Verify payload TCID measurements are loaded into the LPS mission TCID
- Document payload Launch Commit Criteria operations
- Staff the payload consoles in the Launch Control Center during payload pad and launch countdown activities.
- Configure and validate PC Goal software in SSPF CMR and displays in Launch Control Center Firing Room 2
- Configure CMR and Launch Control Center Firing Room 2 payload consoles

- Configure, validate and operate Test, Control and Monitor System (TCMS) for launch activities

4.7.4 Launch Contingency Operations

The contractor shall plan and provide contingency procedures and strategies for payload operations covering launch delay, scrub turnaround, and launch termination scenarios for presentation to and approval by the government. The contractor shall coordinate the procedural sequences for incorporation into OMI S0007 Launch Countdown Volumes.

4.7.5 Post Launch Activities

The contractor shall perform post launch activities such as removing payload-servicing components, support equipment, T-0 patch boards, payload office products and documentation at the OPF, Launch Control Center, pad, Rotating Service Structure (RSS)/PCR, and MLP.

4.7.6 Mission Operations/Payload In Flight Anomalies

During on-orbit operations, the contractor shall provide on-call engineering expertise for payload In-Flight Anomaly (IFA) resolution through the JSC Mission Evaluation Room (MER) and POCC request. IFA analysis shall include requirements satisfaction traceability, historical problem report resolution identification, and problem resolution recommendations based on past payload performance.

The contractor shall perform post flight investigation and corrective action of in-flight anomalies per program level requirements.

4.7.7 Post Landing

The contractor shall satisfy post-landing requirements at the PLS and at the SLS.

The contractor shall perform post-landing and destow operations in coordination with the SFOC.

The contractor shall develop and publish a Mission Annex to the Off-Site Operations Plan (SFOC-GO0021) to document payload requirements and recovery plans for a non-KSC landing. The contractor shall staff and implement appropriate sections of the Mission Annex to the Off-Site Operations Plan in the event of an orbiter landing at a Contingency Landing Site (CLS).

The contractor shall provide post-landing capability as specified in Table 4-4 unless superseding requirements have been documented in the mission LSSP.

The contractor shall apply available resources, in real time, to critical landing activities and prioritized requirements in a best effort situation.

Table 4-4 Post-Landing Capabilities

Condition	Notification	Capability
Nominal EOM (KSC)	Planned	Full
Nominal EOM (SLS)	> 48 hours	Full
Nominal EOM (SLS)	< 48 hours	Best Effort

Early EOM (KSC)	> 3 hours	Full
Early EOM (KSC)	< 3 hours	Best Effort
Early EOM (SLS)	< 48 hours	Best Effort

4.7.7.1 Post Landing Runway Requirements

The contractor shall develop and implement staffing, transportation, and logistics plans and procedures to satisfy landing requirements as identified below:

- Install and configure access through the Spacelab tunnel for SPACEHAB Module flights.
- Develop and conduct integrated procedures per approved requirements for powered payloads.
- Develop and conduct integrated procedures per approved requirements to power-up the active MPLM and refrigerator/freezers within two hours of landing using the MPLM Support Vehicles (MSV). Power and data services shall be maintained until the refrigerator/freezers have been unloaded (nominally four days).

4.7.7.2 SLS Mate/Demate Facility Operations

The contractor shall access the orbiter, perform time-critical activities and prepare the payload for ferry flight back to KSC per approved requirements.

4.7.7.3 OPF Post Landing Operations

The contractor shall perform early access operations per mission requirements.

If payload/orbiter interface IFAs are not resolved on-orbit, the contractor shall conduct joint troubleshooting operations with SFOC to isolate the anomaly to the discrepant side of the interface, prior to deintegration from the orbiter.

The contractor shall conduct payload complement deintegration from the orbiter jointly with the SFOC contractor.

4.7.8 Payload De-Integration

The contractor shall de-integrate subassemblies from their carriers and return the hardware per approved requirements and disposition plans.

4.8 Program Development Projects

4.8.1 MPLM Pad Services

The contractor shall complete integrated verification tasks, including facility, GSE and flight hardware, for the processing of active MPLMs at the launch complex. The contractor shall coordinate MPLM pad support, testing and verification activities with SFOC. Tasks to be completed include, but are not limited to implementation and verification of T-0 umbilical power, command and monitor services for active MPLM pre-launch pad operations. The contractor shall demonstrate capabilities no later than 6 months prior to first operational need (currently UF-3, January 2005).

4.8.2 MPLM Support Vehicle

The contractor shall complete MSV Integrated Verification Testing as described in K-SS-09.5x, Resupply and Return MPLM Support Vehicle Integrated Verification Test Implementation Plan (draft) jointly with SFOC and demonstrate all required capabilities no later than six months prior to the first operational need (currently UF-3, January 2005).

5.0 Ground Systems Readiness and Supportability

The contractor shall plan, operate, maintain, and sustain assigned ground systems as listed in Appendices 5A, 5B, 11, 12, 13, 14, 15 and 16. The contractor's interfaces with the government and other KSC contractors for each assigned facility system are listed in Appendix 12. The contractor shall ensure that changes on the contractor's side of the interface do not cause an overall system outage or damage on the other side of the interface. The contractor shall ensure ground systems readiness to support processing milestones.

The contractor shall schedule and perform ground systems and equipment maintenance, modifications, and new development projects to avoid impact to payload processing activities. For assigned facilities or facility areas, the contractor shall coordinate and integrate payload customer and other government contractor activities so as to avoid any impact to on-going processing activities.

The contractor shall provide planning, analyses, requirements definition, design monitoring, design, procurement, fabrication, implementation, surveillance, activation and validation testing, certification, and required hardware/system turnover documentation during acceptance, modifications and development of new ground systems.

The contractor shall support the meetings listed in Table 5-1.

Table 5–1 Ground Systems Review Support Matrix

Meeting / Review	Frequency	Contractor Responsibility	Remarks
GSE Performance-to-plan	Weekly	S, A, P, I, D, M	Alternate weekly meeting between detailed status meetings and action item reviews. See DR-31 for data requirements.
Facility Performance-to-plan	Weekly	S, A, P, I, D, M	Alternate weekly meeting between detailed status meetings and action item reviews. See DR-31 for data requirements.
Checkout systems performance-to-plan	Biweekly	S, A, P, I, D, M	See DR-31 for data requirements.
Checkout systems testing schedule coordination	Weekly	S, A, P, I, D, M	Testing schedule coordination with affected parties.
KSC Reliability Centered Maintenance (RCM) working group	Monthly	P, I	Contractor to share data and metrics with other KSC organizations and contractors.
NASA RCM working group	Annually	P, I	May be offsite.
KSC Energy Management Working Group	Monthly	P, I	Contractor to share data and metrics with other KSC organizations and contractors.
NASA Ground Systems conferences	Every six months	P, I	May be offsite.
Ground Systems Review Team	Biweekly	S, A, P, I, D, M	See DR-41 for data requirements.
ESR and Facility Projects	Monthly	S, A, P, I, D, M	See DR-41 for data requirements.
CoF Design	As needed	P, I	Applicable to CoF projects affecting contractor assigned facilities and equipment. Minimum of four reviews per project.
CoF Construction	Weekly	P, I	Applicable to CoF projects under construction affecting contractor assigned facilities and equipment. One meeting per week per project with the construction organization.
CoF Review	Monthly	P, I	Only during implementation of CoF projects affecting contractor assigned facilities and equipment.

S= Schedule Conference Room
A= Develop and Distribute Agenda and Schedule
P= Develop and Distribute Presentation Material
I= Present Agenda Items
D= Distribute, Track, and Report Action Items through Closure
M= Generate and Distribute Meeting Minutes

5.1 Facility Operations and Readiness

The contractor shall ensure that all assigned facilities, systems and equipment, including backup equipment, are operationally ready for scheduled payload customer and contractor payload processing activities. The contractor shall schedule facility access and facility system services to support payload processing and avoid impact to payload processing activities.

The contractor shall provide facility services per the facility Standard Interface Document (SID), to satisfy approved payload customer requirements. The contractor shall provide special facility services, when required, as defined by approved processing requirements.

The contractor shall provide payload storage to accommodate launch delay/dwell as defined by approved requirements.

The contractor shall obtain government approval for the following tasks:

- New facility projects and modifications over $50,000
- Facility system and equipment out-of-family problem and anomaly resolutions

5.1.1 Customer Support Documents

The contractor shall prepare and update the following documents for all assigned payload processing facilities:

- Facility Handbook (DR-25)
- SID (DR-25)

5.1.2 Hazardous Facility Operations

The contractor shall prepare and process any waivers and proposed changes to a facility's hazardous quantity/distance site plan requirements with the government.

For SSPF and O&C operations which require ammonia, gaseous oxygen or alcohol, the contractor shall comply with the Interim Safety Requirements for Certain Hazardous Commodities in the SSPF and O&C, dated May 12, 2000.

5.1.3 Facility Space Management

The contractor shall manage assigned facility space including, but not limited to, office space, office layouts and modifications, personnel moves, storage, hardware processing areas, and laboratories. The contractor shall manage SSPF and O&C processing areas used for Space Station and Shuttle Payload processing through the multi-flow assessment process (Ref. Section 2.1.3.3). The contractor shall provide design and drawing support to office areas in the O&C, Engineering and Operations (E&O), and Hanger AE facilities

The west end of the O&C Building has been designated as a Truss Processing Area (TPA) and has been assigned to the ISS Development Contractor until the truss outfitting and acceptance testing is completed (currently scheduled to be complete in FY03).

The contractor shall maintain and update a utilization schedule for the SSPF and O&C off-line laboratories.

The contractor shall administer government and payload customer office areas as assigned and required by the government.

The contractor shall categorize space per KHB 1200.1, Facilities and Real Property Management Handbook. The contractor shall provide office utilization data to the J-BOSC maintained KSC Space Management System for use in analyzing KSC-wide space utilization.

The contractor shall update and maintain:

- A facility space information system to manage the breakdown of assigned space by category and facility. The contractor shall make this system accessible to the government.
- Annual space utilization reports (DR-29)
- Office space graphical layouts for all assigned office areas
- Office layouts and planning for the government and assigned payload customer areas located in the contractor's assigned facilities
- Contractor and assigned payload customer area administrative phone and facsimile machine layouts
- Space utilization drawings for all assigned facilities

The contractor shall assess new space requirements against the contractor's and payload customer's assigned space capabilities. Requirements that cannot be satisfied with existing assigned space shall be presented to the government for assistance in finding the most appropriate resolution.

The contractor shall tear down and buildup system furniture required for office modifications and personnel moves in government, payload customer and contractor office areas. For assigned facility systems and equipment, the contractor shall perform modifications required to reestablish system functionality. The contractor shall coordinate facility layouts and fire alarm systems modifications with J-BOSC.

The J-BOSC will be responsible for all floor to ceiling wall relocations or new construction. The J-BOSC will reconfigure life safety and security systems including but not limited to fire alarm, sprinklers, and electronic security systems.

5.1.4 Facility Outage Coordination

The contractor shall coordinate and perform utility and system outages for the assigned facility systems. The contractor shall coordinate outages with the government, KSC contractors and any affected payload customers. The contractor shall maintain and update the 60-Hertz Circuit Coordination and Documentation System for the planning and evaluation of electrical utility outages.

The contractor shall provide an automated Utility Outage Processing System to coordinate, process, and schedule utility outages within 6 months of contract start. This system shall be interoperable with the J-BOSC and SFOC Integrated Utility Outage Processing System (IUOPS).

5.1.5 Facility Management

The contractor shall develop, implement, and update an overall Facility Management Plan (DR-30). The contractor shall manage facility operations and utilization to optimize both costs and operational readiness.

The contractor shall maintain and update real property records per KHB 1200.1, KSC Facility Space Management Handbook.

The contractor shall provide a facility manager at each processing facility whenever there are active payload processing or major facility modifications. The contractor may assign more than one processing facility to an individual facility manager with government concurrence.

The contractor shall coordinate and obtain support from the contractor's internal organization, government organizations, or other KSC contractors. The contractor shall track all Support Requests, both internal and those forwarded to other contractors, for work at the contractor assigned facilities and for payload customer-required changes.

5.1.6 Daily Facility Reporting

The contractor shall provide electronic (e-mail or web-based) daily facility performance reporting for all operational facilities to the government (DR-31).

5.1.7 Facility Crane Operations

The contractor shall provide a capability for dual overhead cab-operated crane operations a minimum of five days per week, single shift operation.

The contractor shall update and maintain emergency procedures for contingency actions such as power loss, brake failure, or other emergencies.

The contractor shall provide training to allow payload customers to operate facility lifting devices including pendant cranes, forklifts and man lifts. The payload customer will not operate the cab-operated cranes in the SSPF and the O&C building, or the CRF crane.

5.1.8 Facility Cleanliness and Environmental Conditions

The contractor shall maintain specified levels of cleanliness in clean work areas per KCI-HB-5340.1, Payload Facility Contamination Control Implementation Plan (DR-32). The contractor shall monitor and maintain cleanliness levels at all times except when taking a facility off-line with government approval.

The contractor shall monitor and measure the PPF environment per K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements Plan. The contractor shall notify the government and affected payload customers of any out of specification condition per the call tree within four hours.

The contractor shall provide special cleanliness equipment and procedures when specified by approved requirements.

5.1.9 Facility and Equipment Cleaning

The contractor shall clean or ensure that the payload customer cleans all equipment brought into the processing area to a level of "visibly clean" or better prior to entry per JSC SN-C-0005, Contamination Control Requirements.

The contractor shall maintain and operate the cleaning capability outside of the CRF for large shipping containers and other equipment prior to entry to a clean room facility. The contractor shall clean payload customer shipping containers and equipment with payload customer

permission including, but not limited to, large item cleaning at the CRF or outside of the receiving facility; cleaning of equipment or shipping containers in an airlock, inspection area and receiving area; and routine cleaning in the processing area.

5.1.10 Facility Access Control

The contractor shall manage personnel, equipment, and material access to all of the active processing bays located within the contractor's assigned facilities. The contractor shall use and monitor the Access Control Intrusion Detection System (ACIDS) for entry to and exit from the large processing areas of the PPFs. The ACIDS system is operated, maintained, and sustained by the J-BOSC and provided by the government.

The contractor shall provide the appropriate employee information to the J-BOSC operated Visitor Records Center for the issuance of employee and visitor area access badging by J-BOSC.

The contractor shall coordinate with J-BOSC the opening and closing of all alarmed doors that are monitored by the Electronic Security System provided by the government.

5.1.11 Facility Communications Circuits

SFOC/CSOC* will provide voice, video, and data communication services, including video distribution systems services (except for flight), transmission services, cable system services, communication services, computer network services, OIS-D, radio services, paging and area warning, point-to-point telephone, conference room sound reinforcement, extension of Nascom Network voice/data, voice and video recording, secure communication at KSC and the sustaining engineering services for the Photo Optical Control System (POCS) and the Timing and Countdown joint services contracts at KSC and CCAFS.

*SFOC-provided service will transition to CSOC on 10/1/2002.

5.1.11.1 Customer Circuit Connection

The contractor shall provide intra-system cabling and communications services. The contractor shall coordinate and schedule communication services with SFOC/CSOC for assigned test areas, stands, computer rooms and control/user rooms. The contractor shall connect and schedule usage of contractor and payload customer circuit connections to the SFOC/CSOC or Outsource Desktop Initiative for NASA (ODIN) interface. The contractor shall provide connection cabling from the contractor and payload customer's equipment to the SFOC/CSOC or ODIN interface.

The contractor shall coordinate, schedule and initialize government and payload customer videoconferences in the SSPF as required.

5.1.11.2 Telephone Circuit Connection

The contractor shall coordinate assigned payload customer, test stand and control/user room area administrative phone and facsimile machine additions and changes with the government and the ODIN contractor.

The contractor shall provide dial-up modems and auto dialers for payload customer use per approved requirements.

5.1.11.3 (Reserved)

5.1.11.4 Launch Complex 39 and Launch Control Center Communications Circuits

At Launch Complex (LC) 39, the contractor shall connect and schedule usage of contractor and payload customer circuit connections to the SFOC/CSOC interface or other KSC contractor's interface. The contractor shall coordinate and patch T-0 circuits and other payload customer circuits in the MLP and in room 220 and room 221 of the Pad Terminal Connection Room (PTCR) per approved requirements.

The contractor shall coordinate with SFOC/CSOC and verify end-to-end communications circuits between the pad and the Launch Control Center and the LC 39 area and Industrial Area control/user rooms.

5.1.12 Complex Control System Interfaces

The contractor shall operate, maintain, and sustain assigned facility 60 Hz. power sensors and wiring up to the Complex Control System (CCS) SFOC interface per Appendix 12. The SFOC will provide a complex control system for the monitoring of Industrial Area power systems. J-BOSC will monitor the complex control system from the Launch Control Center.

The contractor shall provide a call tree to the CCS console at the Launch Control Center for J-BOSC notification in the event that CCS is reporting a problem with a contractor's assigned facility. The contractor shall establish contingency plans to react to a CCS reported problem and shall notify the government and payload customer.

The CCS is in the process of being upgraded by NASA. Once these upgrades are complete the system will officially be known as the Kennedy Complex Control System (KCCS).

The contractor shall coordinate and support outages as required to complete the upgrade to the KCCS.

5.1.13 Facility Standby Mode

The contractor shall optimize payload processing facilities utilization by taking facilities or portions thereof (e.g. selected systems, altitude chamber) to a standby mode.

The contractor shall analyze payload processing facility utilization during inactive periods to evaluate standby mode risk, and the economic and operational feasibility to place a facility in standby mode. The contractor shall present the analysis to the government for approval no later than 14 days in advance of the intent to place a facility or portion thereof into a standby condition. The contractor shall develop, update and implement a Facility Standby Report (DR-33) that presents the status of PPF utilization and any proposed standby planning.

The contractor shall define the standby conditions and proposed deviations to temperature and humidity from the required specifications for government approval.

The contractor shall prepare the facility for payload processing 14 days prior to the Operational Readiness Date (ORD) or unless otherwise defined per requirements.

The contractor shall transition the VPF to a modified mothball mode and the SAEF2 to a modified abandon mode as described in NPR 8800.15A and agreed to deviations. The transition is to be accomplished in conjunction with the other activities associated with the termination of the Payload Carriers Program (PCP).

5.1.14 Frequency Coordination

The contractor shall coordinate and obtain authorization for all new contractor and new payload customer equipment's radio frequency transmissions from the KSC Frequency Control Officer Spectrum Manager per the requirements of KHB 2570.1, KSC Radio Frequency Spectrum Management Handbook. The contractor shall ensure that all newly purchased equipment is issued a Radio Frequency Authorization (RFA) by the KSC Frequency Control Officer Spectrum Manager. The contractor shall ensure that any contractor assigned equipment replacement item is within the spectrum bandwidth previously approved for contractor or payload customer use by the KSC Frequency Control Officer Spectrum Manager.

Crane radios are provided by the SFOC/CSOC. Cellular telephones, two-way pagers, "cordless" telephones, and wireless computer keyboards/mice have been authorized as a class of stations. Users do not have to request individual RFAs.

The contractor shall ensure that all transmitting devices, including cellular phones are restricted from being located near flight hardware or ground support equipment per the distance requirements of KNPR 8715.3, KSC Safety Practices Procedural Requirements.

5.1.15 Facility and Equipment Readiness Reporting

The contractor shall prepare a Facility and Equipment Readiness Report (DR-34).

The contractor shall present the facility and equipment readiness for all payloads, a minimum of one week prior to payload support equipment arrival, at the government led GOR and other readiness reviews.

5.1.16 Battery Servicing

The contractor shall provide any required services for payload and payload customer battery charging as documented in the LSSP. The contractor shall provide servicing of batteries including, but not limited to, lead acid, potassium hydroxide, silver zinc, nickel cadmium and nickel hydrogen batteries. The contractor shall arrange for the use of the SFOC Battery Shop when SFOC has the equipment and expertise required for a unique type of battery, such as nickel hydrogen batteries.

5.1.17 Facility Energy Consumption

The contractor shall assist KSC in achieving federally mandated energy conservation goals. The contractor shall collect, analyze, and prepare utility consumption data and reports (DR-35).

The contractor shall manage, implement, and maintain processes to reduce energy consumption including, but not limited to:

- Office lighting controls and procedures
- Heating, Ventilation and Air Conditioning (HVAC) controls and procedures

5.1.18 Facility Heating, Ventilation and Air Conditioning Systems

The contractor shall report chilled water usage for each facility (DR-35). The contractor shall meet all of the energy guidelines of Section 5.1.17.

The contractor shall develop, update and implement a HVAC Heat Load Shed Plan (DR-30) for all assigned processing facilities.

The contractor shall bring the SSPF back-up systems, in coordination with J-BOSC, on line within 4 hours in the event of a problem with hot or chilled water delivery.

The contractor shall maintain the SSPF standby main high bay air-handling unit in a state of readiness.

5.1.19 Andover Control Systems

The contractor shall test and validate all Andover software changes and ladder logic prior to loading the software onto an operational set. The contractor shall exchange HVAC and facility environmental data with the J-BOSC via an Andover data exchange interface. The contractor shall back-up and archive all Andover software.

The contractor shall provide the government and payload customer access to the Andover environmental monitoring system graphic layouts of assigned operational facilities.

The contractor shall provide a data printout, graphic data, and report to the government within 48 hours following any anomaly or out of specification condition for any facility system monitored by Andover. The data presented to the government shall indicate the start time, duration, and magnitude of the problem.

5.1.20 SSPF Ammonia Processing

The contractor shall configure, operate, maintain, and sustain the SSPF systems to perform ammonia servicing and testing.

5.1.21 O&C Altitude Chamber Operations

The contractor shall maintain the west altitude chamber in the standby mode until needed. The contractor shall perform a demonstration/validation of the altitude chamber when it is reactivated from the standby mode at least 30 days prior to the next scheduled use date. The contractor shall ensure that the east altitude chamber can be safely used for storage.

5.1.22 Facility or Fixed Equipment Location Siting

The contractor shall comply with NPG 8820.2, Facilities Project Implementation Handbook. The contractor shall prepare drawings locating the placement of new facilities or fixed equipment. The government will approve all physical location siting plans for any new facility foundations or

concrete slabs. The contractor shall submit the siting plans no later than the 30% design review.

5.1.23 Hurricane Recovery Effort

The contractor shall support the Hurricane Frances and Hurricane Jeanne recovery effort at KSC to return facilities and equipment back to pre-hurricane condition based on assessment from the Damage Assessment and Recovery Team (DART). The contractor shall participate on the KSC Recovery Team (KRT); assess CAPPS KSC facilities and equipment; develop and prioritize the CAPPS Hurricane Recovery Master List of projects; and execute facility repairs, personnel relocations and equipment maintenance and replacement.

5.2 Ground Support Equipment Operations and Readiness

The contractor shall ensure that all assigned support equipment is operationally ready for scheduled payload customer and contractor payload processing activities. The contractor shall schedule support equipment services to support payload processing and avoid impact to payload processing activities.

The contractor shall develop, update and implement a Support Equipment Standby Plan (DR-33). The contractor shall notify the government at least 14 days prior to placing the equipment in the standby mode.

5.2.1 Payload Canister and Transporters

The contractor shall operate, maintain and sustain payload canisters and transporters at KSC/CCAFS per approved requirements.

5.2.2 Payload Environmental Transportation System

The contractor shall operate, maintain and sustain the Payload Environmental Transportation System (PETS) per approved requirements. The PETS is currently in the standby mode.

5.2.3 Access and Handling Equipment

If the handling operation is new or is using new equipment that is critical to the operation, the contractor shall analyze and determine the most suitable handling devices. The analysis shall include, but not be limited to the handling device, the weight and center of gravity of the item to be handled, and a determination of whether a hydraset is required.

5.2.4 Late Orbiter Access and Post Orbiter Landing Support Equipment

The contractor shall operate, maintain and sustain all assigned support equipment used for late payload access to the Orbiter prior to launch.

The contractor shall operate, maintain and sustain all assigned support equipment used to service payloads following the Shuttle landing at the KSC Shuttle Landing Site, the Dryden Flight Research Center (DFRC) and the White Sands Test Facility.

The contractor shall operate, maintain, and support sustaining (Reference Section 5.5) of the MSVs at both KSC and DFRC. The contractor shall operate, maintain and sustain assigned Conditioned Cargo Transport Equipment (CCTE) at both KSC and DFRC. The contractor shall plan and implement relocation of the DFRC based MSV and CCTE to the assigned SLS as required. The contractor shall coordinate and implement MSV and CCTE operations and interfaces in accordance with contractor-to-contractor agreements.

5.2.5 Simulators and Avionics Support Equipment

The contractor shall coordinate with the HUB to obtain required Flight Equivalent Units (FEUs) to support approved testing requirements.

The contractor shall maintain the removable test sets and equipment contained in the Payload Test and Checkout System (PTCS) and located in the communications and tracking ground station, including the ITCS servicing unit, space to ground test set, and the video test set, such that the equipment can be relocated to a test stand to support payload testing.

5.2.6 Life Support

The contractor shall perform periodic inspections of life support equipment furnished by J-BOSC. The contractor shall recharge cryogenic backpacks before return to J-BOSC.

5.3 Checkout Systems

The contractor shall use, operate, maintain and sustain the Checkout Systems as described in Table 5-2.

Table 5-2 Checkout System Responsibilities*

System	Function	Contractor	Government	Comments
TCMS	Verify ISS 1553 busses and RS-422 and IEEE-488 GSE busses.	U, O, M, E	U	Incorporate Partial Payload Checkout Unit (PPCU) capabilities within three years.
PPCU	Verify unique partial payload interfaces.	U, O, M, E	U	Close out this system
PTCS	Verify ISPR, EXPRESS Racks, EXPRESS Pallets and Utilization Payloads	U, O, M, E	U	MSFC develops HOSC software for PMN GCS-00512 & GED-00891 Includes UOME of upgrades associated with ISS Downlink Enhancement Architecture (IDEA) at KSC. Includes UOME of upgrades associated with Integrated Station Local Area Network (ISL) at KSC. Sustaining engineering and maintenance for associated FEUs (edge router) are ISS Program-provided.
Payload Rack Checkout Unit (PRCU)	Verify ISS racks before integration for flight	U, O, M	U, E	Interface with MSFC sustaining engineering required.

U = USE this system
O = OPERATE this system
M = MAINTAIN this system
E = Sustaining ENGINEERING for this system and perform any required development work.
* See Appendix 14 for detailed listing of hardware and responsibilities

5.3.1 User Test Products

The contractor shall develop test application software, data bank definitions, and all other test products required to use and operate required checkout systems.

5.3.2 Shuttle Processing Test Products

The contractor shall develop and provide to SFOC test application software, data bank definitions, and all other test products required for the contractor to use the shuttle processing checkout system when required to process payloads through the launch process.

5.3.3 EHS/PDSS Integrated Change-out (EPIC)

The contractor shall design and implement changes to the Payload Test and Checkout System (PTCS) and the Test, Control and Monitor System (TCMS) to remotely interface and functionally operate with two systems at the Marshall Space Flight Center (MSFC)—Enhanced Huntsville Operations Support Center System (EHS) and Payload Data Services System (PDSS) in support of experiment and payload processing activities.

5.4 Ground Systems Maintenance

The contractor shall implement a maintenance program incorporating RCM in accordance with NPG 8831.2C, Facilities Maintenance Handbook for assigned ground systems. The level of maintenance provided shall ensure the reliability, cost effectiveness, serviceability, and longevity of the assigned systems and equipment. For items maintained by the contractor and sustained by another organization, the contractor shall coordinate, integrate and implement assigned upgrades and modifications.

The contractor shall maintain all applicable software and firmware for the assigned systems, facilities, and equipment.

The contractor shall develop, update and implement a Maintenance Plan (DR-36).

The contractor shall provide Backlog of Maintenance and Repair (BMAR) data to the government annually at the end of each fiscal year per the requirements of NPG 8831.2C (DR-36).

The contractor shall retain the previous five years of historical ground systems maintenance and repair data for trending purposes*. The government will provide, at contract start, a copy of the historical facility maintenance and repair data, in comma-delimited format, for the period of 1997-2001.*

5.4.1 Maintenance Work Control and Scheduling

The contractor shall perform all operations and maintenance tasks in accordance with work authorization documents developed by the contractor and based on approved requirements. The contractor shall use, update, and implement a computerized maintenance management system (Reference Section 6.1.3) to schedule and track maintenance of assigned systems and equipment. The system shall have the capability to:

- Provide historical and statistical data
- Provide current visibility of all maintenance tasks
- Schedule, track and report
  - Preventive and predictive maintenance
  - Facility inspection and assessment
  - Utilities management

5.4.2 Facility Condition Assessments

The contractor shall prepare Facility Condition Assessments for all assigned facilities and facility systems (DR-37).

5.4.3 Ground Support Equipment and Checkout System Assessments

The contractor shall prepare Ground Support Equipment and Checkout System Condition Assessments for all designated support equipment and checkout systems (DR-38).

5.4.4 Warranty Maintenance

The contractor shall maintain warranty or guarantee records for assigned ground systems for any warranty or guarantee period. The contractor shall investigate the failure of any covered equipment or material, report findings to the government, and take no action that would void a warranty without prior approval from the government representative. The contractor shall obtain warranty documents on all warranted equipment and materials installed by the contractor.

5.4.5 Corrosion Control

The contractor shall provide corrosion control for all equipment identified in Appendix 12. The contractor shall control corrosion of equipment through rust prevention and rust correction activities. Rust prevention activities shall include, but are not limited to, the application of protective coating. Rust correction activities shall include, but are not limited to: scraping and treatment of corroded area with an application of protective coating, removal and replacement of corroded area and application of protective coating.

Corrosion evaluations and corrective actions shall be incorporated into Facility Condition Assessments, as required by paragraph 5.4.2.

5.5 Ground Systems Sustaining Engineering

The contractor shall perform sustaining engineering for all ground systems including software and firmware identified in Appendices 5B, 11, 12, 13, 14, 15 and 16 to meet the original design intent (i.e. form, fit and function).

The contractor shall provide engineering services and task level support to upgrade systems and equipment performance and to improve safety, reliability, maintainability, functionality and cost effectiveness.

5.5.1 GSE Sustaining Engineering Support to NASA

The contractor shall provide sustaining engineering support functions listed below to the government for support equipment items listed in Appendix 5A:

- Safety and mission assurance activities per the requirements of Section 3.0
- Drafting, design visualization, Computer Aided Drawing (CAD), checking and Ground Operations Processing Data Center (PDC) releases
- Logistics per the requirements of Section 7.0

- Technicians and quality support
- Procedure validation and turnover package preparation
- Integrated scheduling
- Configuration Management
- OMIs, testing, validation and activation services
- Develop and document the government/contractor Sustaining Engineering Plan (DR-39)
- Change Control Board Directive (CCBD) support and documentation
- ESR tracking, scheduling, and presentation package duplication and distribution
- Analysis and integration team functions, including metrics, budget/project support, cost exercises, integration among other contractors and teams, and contract administration support
- Coordination of ICD activities that pertain to KSC facility/Support Equipment (SE) interfaces

5.5.2 Modification and New Requirements Processes

The contractor shall perform modifications to configured facility, ground and checkout systems, and support equipment per the requirements of KHB 1200.1, Facilities and Real Property Management Handbook.

The contractor shall track work forwarded to other KSC contractors if the ESR affects a payload customer, assigned facility or equipment item.

The contractor shall obtain approval from the government for all ESRs with an estimated cost exceeding $50,000 prior to implementation.

5.5.3 Support Equipment Tracking Databases

The contractor shall input and update the status of any new, standby, or excess items of ground support equipment into the TR1287, KSC Support Equipment List By Title Number. The contractor shall provide an annual listing (DR-40) of all GSE being used or in standby mode in each facility.

5.5.4 Systems Engineering

The contractor shall provide systems engineering, field engineering and design integration for all assigned ground systems to the demarcation point with systems and equipment under the responsibility of other KSC contractors. The contractor maintained and updated technical data shall include those documents, which identify each part and its precise configuration at any level of assembly required to support KSC activity. The contractor shall ensure that no change on the contractor's side of the interface causes an overall system outage or damage on the other side of the interface.

The contractor shall review applicable ICDs and, when required, update the GSE configuration to maintain compatibility with flight hardware interfaces.

The contractor shall conduct and schedule functional design reviews for all appropriate levels of changes.

5.5.5 Engineering and Drawings Standards

The contractor shall provide engineering, drawings and other documents in accordance with KSC-DE-512-SM, Facility, System, and Equipment General Design Requirements. The contractor shall release documentation in accordance with KDP-KSC-P-1537, Document Release Authorization (DRA) Process. The contractor shall maintain existing drawings per the existing format.

5.5.6 Ground Systems Design

The contractor shall provide design services for all assigned ground systems. The contractor shall define requirements with the payload customer for any new design changes. System and configuration changes that affect the functional capability of system or hardware and software architecture require formal design reviews. The design review process shall be in accordance with KDP-KSC-P-1535, Design Review Process.

The contractor shall design ISS support equipment in accordance with SSP 50004, ISS Program Ground Support Equipment Design Requirements. The contractor shall design and certify support equipment that interfaces with Shuttle flight hardware or ground systems in accordance with SW-E-002, Space Shuttle GSE General Design Requirements.

The contractor shall obtain government approval for new GSE development with an estimated cost exceeding $50,000.

5.5.6.1 Preliminary Design

The contractor shall coordinate with affected organizations to develop and convert operational requirements into preliminary design concepts including, but not limited to ROM cost estimates. The contractor shall prepare an interim or preliminary design package when changes affect critical components or changes affect more than 10% of a system or equipment item. The contractor shall provide technical data in the preliminary design review package including, but not limited to, schematics, block diagrams, preliminary reliability and hazard analyses, list of long lead items and other engineering data.

The contractor shall conduct a formal Preliminary Design Review (PDR) for GSE that interfaces with flight hardware and software unless the appropriate control board imposes other requirements or waives the need for such design reviews. Required design reviews shall be documented in the technical assessment. The contractor shall invite representatives from the design centers responsible for the interfacing flight hardware. Following the preliminary design review, the contractor, with government concurrence, may proceed with long lead time item procurement of parts required to meet an implementation need date for new or modified facilities and equipment.

5.5.6.2 Final Design

The contractor shall prepare the final or CDR package including, but not limited to, working drawings, procurement specifications, software criteria (if applicable), installation approach, cost estimates, parts lists, schedules, activation and validation plan, and reliability, supportability and safety analyses.

In the final review or CDR, the contractor shall address the maintenance concept for the system or equipment item. The contractor shall address the following areas, including but not limited to:

- Accessibility for maintenance and operation
- Built-in test equipment
- Self-test capabilities
- Mean time between failures
- Mean time to repair
- Maximum repair time
- Inspection frequency and maintenance hours

When design changes create criticality Category 1, 1S, or 2 single failure points or hazardous conditions, the contractor shall conduct a formal CDR, which includes a representative from NASA Safety. The contractor shall update the systems safety assessment (Reference Section 3.1.2

The contractor shall conduct a formal Critical Design Review (CDR) for GSE that interfaces with flight hardware and software unless the appropriate control board imposes other requirements

or waives the need for such design reviews. Required design reviews shall be documented in the technical assessment. The contractor shall invite representatives from the design centers responsible for the interfacing flight hardware. Before any GSE that interfaces with flight hardware can be used, the contractor shall complete a formal presentation of readiness at a government led Design Certification Review (DCR) unless the appropriate control board imposes other requirements or waives the need for such review. DCR requirement or proposal to waive it shall be documented in the technical assessment.

5.5.6.3 Human Factors Design Engineering

The contractor shall review designs to assess the need to perform a human factors analysis prior to initial design release. The contractor shall perform a human factors analysis prior to changes to critical controls and displays.

5.5.6.4 Modification Packages and Instruction

The contractor shall develop modification packages and instructions to implement design changes, which include the development of Engineering Instructions (EI) packages, preparation of material lists, and detailed installation instructions. The contractor shall formally release the modification package using the DRA process. The contractor shall prepare and ensure completion of a punch list of open items.

5.5.6.5 Modification, Activation and Validation

The contractor shall activate and validate all modifications or new capabilities at the end of installation and prior to hardware and system turnover operations. The contractor shall coordinate with the user organization during final activation and validation.

The contractor shall provide the services required to certify ground systems, including support equipment provided as government furnished equipment, for contractor use in its operating environment.

5.6 Engineering Studies and Analysis

The contractor shall evaluate program requirements and flight hardware designs for impacts to KSC facilities and equipment. The contractor shall perform engineering analyses and assess ground system impacts to safety, reliability, operability, scheduling, documentation and logistics. The contractor shall include in the assessments an implementation strategy, proposed coordination with other contractors, effects of proposed design on other contractors' systems and operations, cost estimate, installation and testing requirements, environmental analyses, required documentation per existing federal and state regulations, and any necessary trade studies.

5.7 Facility Construction Projects

The contractor shall implement Non-CoF construction projects. The contractor shall provide requirements, technical and cost data for the design and construction of facility projects per NPG 8820.2, Construction and Labor Provisions, and in NASA Policy Guideline.

The contractor shall provide facility projects cost proposals including, but not be limited to construction management, construction (for assigned projects), construction surveillance, program required documentation, activation, facility as-builts and hardware and system turnovers.

The contractor shall provide a monthly report addressing each construction project cost schedule and performance (DR-41).

The contractor shall provide a recovery plan within two weeks of any over budget or schedule milestone slip for assigned projects. The recovery plan shall address the proposed mitigation offered. For non-CoF facility projects, any reduction in scope shall take into consideration the approved NASA Form 1509 content and scope of work. The contractor shall revise the NASA Form 1509 as required for government approval.

The contractor shall develop and submit a Non-CoF Facility Projects Five-Year Plan (DR-42) and a CoF Five-Year Plan (DR-43).

The government will provide blocks of unique Project Control Numbers (PCNs) to the contractor. The contractor shall only assign a government PCN for facility projects exceeding $50,000. The contractor shall use PCNs for each facility project in all documentation and databases.

5.7.1 Non Construction of Facilities Projects

The contractor shall submit NASA Form 1509 and a facility requirements list for government approval prior to start of design of Non-CoF facility projects exceeding $50,000. The facility requirements list shall establish the system requirements for the proposed project in enough detail to correlate with the contractor's estimate.

The contractor shall provide project activity breakdown to the government in sufficient detail to allow for an independent evaluation of all tasks including but not limited to design, construction management, construction, activation, documentation and turnover.

5.7.2 Construction of Facilities Program

The contractor shall develop, update and submit to the government the CoF budget documentation and Project Identification Sheets as required to meet the annual government budget development schedules. The government will notify the contractor of those projects included in the approved CoF budget.

During project design and construction, the contractor shall review project packages and provide engineering and scheduling consultation to the implementing organization.

The contractor shall prepare Facility Requirements Documents (FRD) (DR-44).

5.7.3 Facility Activation and Validation

The contractor shall activate and validate all modifications or new capabilities at the end of installation and prior to hardware and system turnover operations. The contractor shall coordinate with the user organization during final activation and validation.

The contractor shall complete punch list items, make-work modifications, and interim maintenance during and following construction. The contractor shall perform integrated testing, if required, after the installation of non-collateral equipment and systems.

6.0 Information Technology

The contractor shall provide all data and IT systems to perform the requirements of this contract. This includes, but is not limited to, all associated hardware, system software, applications, test application software, firmware, Commercial Off the Shelf (COTS) software, displays, databases, data storage and measurement definitions.

The contractor shall develop, operate, maintain, and sustain IT systems and applications identified in Appendix 16 and software identified in Appendix 13. These include, but are not limited to:

- Desktop computers and portable computing devices
- Peripherals
- Enterprise computational systems
- Network servers
- CAD/ Computer Aided Engineering (CAE) workstations

The contractor shall develop, update, and implement an IT Plan (DR-45).

6.1 Information Technology Operations

6.1.1 Data Sharing

The contractor shall implement an architecture that enables bi-directional digital data sharing with government representatives within the KSC domain or its successor.

6.1.1.1 Kmail and Global Address List Update

The contractor shall provide daily (Monday through Friday) updates to the KSC X.500 Directory (Kmail) including, but not limited to, all e-mail user and address data. The contractor shall maintain NASA Locator (Facility Center) data current on all active employees.

6.1.1.2 Calendar Compatibility Requirement

The contractor shall provide integration and interoperability between their calendar system and the NASA Calendar System. Automated meeting and resource scheduling and notification between the systems; calendar and resource sharing and viewing between the government and the contractor are examples of the interaction that is required. The current NASA Calendar System is Microsoft Outlook.

6.1.1.3 Desktop Application Interoperability

The contractor shall maintain interoperability between the contractor's desktop application environment and the government's desktop application environment per NASA-STD-2804E, Minimum Interoperability Software Suite. If the contractor implements Public Key Infrastructure, the contractor system shall be interoperable with the NASA Public Key Infrastructure system.

6.1.2 Help Desk

The contractor shall operate a user help desk to support government, IP/P, NASA customers, and payload developers involved with computational and digital communication resources operated by the contractor. The contractor shall coordinate, provide expertise and assist in the isolation and resolution of IT systems data exchange problems with non-CAPPS organizations.

The contractor shall maintain a problem tracking system as part of the Help Desk function. The contractor shall report to the initiator when the problem is closed and maintain data on help desk performance via use of the problem tracking system.

6.1.3 SAGER Control and Monitor System

The contractor shall develop and deliver a web-based control and monitor system (SAGER) for the environmental growth chambers to be located in the Space Experiment Research & Processing Lab (SERPL) facility. The contractor shall work with NASA to develop server/database interface software, support problem resolution for the prototype demonstration dry run, and support the SERPL SAGER testing prior to system activation and delivery.

6.1.4 MAXIMO

The contractor shall use, operate, maintain and sustain the MAXIMO system. Within six (6) months of the start of CAPPS, the contractor shall manage the maintenance of all GSE systems with MAXIMO, provide the MAXIMO interface to the Training, Tracking, and Scheduling System (TTSS) database, provide a MAXIMO capability to perform change tracking, provide a reporting capability from KSC IMS databases, and implement a Utility Outage Processing System (Reference Section 5.1.4).

6.1.5 Digital Networks and Other Communication

The contractor shall operate and maintain all intra-system communication functions within the systems for which it is responsible. Appendix 12 identifies demarcation points and physical interfaces with the KSC communication contractor.

6.1.6 Two and Three Dimensional Models and Simulations

The contractor shall provide, operate, maintain, and sustain a high-fidelity simulation and visualization capability (two dimensional and three dimensional software modeling) to address flight hardware and GSE processing, space utilization, access, and clearance concerns. The contractor shall use the models to evaluate the management of processing area floor space in the multi-flow analysis per Section 2.1.3.3; for the modeling analysis of exceptionally time critical processes such as Launch on Need (LON) mission assessments per paragraph 4.6; for selected hazardous operations; or when requested by the government.

The contractor shall update or provide new models and simulations when complex equipment moves require analysis, a new payload test setup requires evaluation, multiple payloads are sharing a processing area, new or modified facility or equipment changes have occurred, when special studies require a motion analysis, or when requested by the government. A list of existing models and simulations is provided in Appendix 15.

6.1.7 Enterprise Computing Systems

Enterprise Computing Systems are listed in Appendix 16. The contractor shall provide Payload Data Management System (PDMS) functionality to authorized organizations and personnel outside CAPPS on a 24-hours per day/7-day per week basis.

The contractor shall update the Electronic Connect/Disconnect Log (ECDL) to include all assigned flight hardware interfaces and flight-to-ground support equipment interfaces within two years of contract start.

6.2 Information Technology Security

The contractor shall comply with NPG 2810.1, NASA's Security of Information Technology Guideline. Existing systems retained by the contractor, shall be brought into compliance within six months of the contract start date. New systems shall be compliant prior to authorization to process. The contractor shall develop, update and implement an IT Security Plan (DR-46). NASA IT Security personnel will perform the penetration testing requirements of NASA-STD NPG 2810.1 section 4.6 per KDP-KSC-P-1334.

6.2.1 NASA System Administrator Information Technology Security Certification Program

The contractor shall demonstrate that system administrators and personnel with authority to perform system administrator tasks have knowledge consistent with the NASA System Administrator Security Certification. This certification consists of a two-tier assessment which verifies that systems administrators are able to:

A. Demonstrate knowledge in system administration for the operating systems for which they have responsibility.
B. Demonstrate knowledge in the understanding and application of Network and Internet Security.

The contractor shall make a reasonable effort to enable all system administrators to pass the applicable, NASA-designated Operating System test and Network and Internet Security test. This level of proficiency of system administrators shall be demonstrated every three years consistent with the NASA System Administrator Security Certification. The contractor is not required to maintain any new level of proficiency with their system administrators in the years between the tests.

7.0 Logistics

The contractor shall perform logistics functions in support of shuttle, payload carrier, ELV, and ISS payloads consistent with KSC designated responsibilities.

7.1 Logistics Management and Integration

The contractor shall develop, update, and implement a Logistics Support Plan (DR-47).

The contractor shall develop and update logistics documents to include, but not limited to:

- K-SS-12.09, KSC Operational Logistics Plan
- K-SS-12.10, Logistics Capabilities Manual
- K-SS-12.11, Oversized Element Transportation On-Site KSC Logistics Plan
- K-SS-12.12, Maintenance Support Baseline (MSB)
- K-SS-12.12.1, Depot & Orbital Replacement Unit/Shop Replaceable Unit (ORU/SRU) Certification Plan
- K-SS-12.13, Logistics Management Responsibility Transfer (LMRT)
- K-SS-12.14, International Space Station Asset Tracking Plan
- K-SS-12.15, ISS KSC Logistics Fleet Resource Management (FRM) Implementation Plan
- K-SS-12.16, ISS and Space Shuttle Payloads Certification of Flight Readiness (CoFR) Logistics Plan
- K-SS-12.17, NASA KSC ISS/Payloads Receiving and Shipping Guideline
- K-SS-12.18, NASA KSC ISS Maintenance Support Equipment (MSE) Management Plan

The contractor shall participate in a weekly KSC ISS and Payload Logistics Working Group. The contractor shall participate by providing logistics project status and reports, metrics, and mission support posture.

The contractor shall provide a technical and cost assessment for LMRT requests of hardware to KSC.

7.2 Logistics Operations

7.2.1 Depot Capability

The contractor shall provide a depot capability that supports payload processing activities.

The contractor shall repair and maintain hardware and equipment listed in Appendices 2, 5A, 5B, 11, 12, 14, 16, 17 and 18. The contractor shall provide depot capabilities to flight hardware sustaining engineering organizations upon request.

The contractor shall utilize government approved and certified repair centers per SSP 50276, ISS Depot Facility and Certification Plan, for flight hardware maintenance and repair.

The contractor shall provide the capability to perform and implement depot support functions to include, but not be limited to:

- Structural, mechanical, and cable fabrication
- Fiber optics test and repair
- Proof loading
- Hydrostatic testing
- M&P services
  - Chemical sampling and analysis
  - Process engineering
  - Material engineering
  - NDE
  - Material testing
  - Contamination/cleanliness control

The contractor shall plan, implement, and manage a repetitive maintenance program for all hardware and equipment that require calibration. The contractor shall perform calibration for the items identified in Appendix 18 to support payload processing activities and payload customer requirements. The contractor shall utilize the government furnished service for calibration available through the J-BOSC contract for all other assigned hardware and equipment calibrations.

7.2.2 Material Management

The contractor shall provide a material management capability in support of payload processing activities.

This effort includes the following:

- Material Service Centers (MSC)
- Tool loan
- Bench stock
- Garment issue
- Instrument library
- Warehousing and storage
- Receiving
- Distribution and Issue
- Kitting
- Transportation and shipping
- Packing and crating
- Inventory management
- Property administration
- Procurement
- Subcontract management
- Customs coordination

7.2.2.1 Warehousing

The contractor shall utilize KSC/CCAFS assigned facilities to satisfy storage requirements prior to utilizing off-site facilities.

The contractor shall store all flight ORUs, Line Replaceable Units (LRUs), and SRUs on-site.

The contractor shall store all flight hardware in the following environmental conditions:

- Humidity greater than 30% but less than 70%
- Temperatures between 68 and 82 degrees Fahrenheit

The contractor shall segregate flight and non-flight hardware with the same master part number. Materials with batch/lot requirements shall be stored in such a manner as to prevent mixing of individual batches and lots.

7.2.2.2 Inventory Management

The contractor shall provide an Inventory Management System (IMS) for the tracking and management of equipment, spares, repair parts, supplies, material and shipping containers.

The IMS shall interface with the JSC ISS asset tracking and management system, GOLD.

The contractor shall utilize and affix IMS labels per the requirements identified in the SSP 50007, Space Station Inventory Management System Label Specification.

The contractor shall review NASA, government, and industry alerts such as GIDEP per KHB 5310.1, Reliability, Maintainability, and Quality Assurance Handbook. The contractor shall identify the affected hardware within the contractor's responsibility including off-site vendors and depots, perform an analysis of the problem, provide recommendations and corrective actions to the government, implement corrective actions if required and notify the government of corrective actions taken.

The contractor shall obtain from the SFOC all transducers, pyrotechnic connectors, KC fittings, buttweld fittings (KSC designed), and stainless steel tubing per KSC SPEC-Z-0007. The contractor shall provide usage-forecasting data for these items (DR-48).

The contractor shall obtain required propellants, cryogenics, fluids, gases, bulk chemicals, and commodities as a government provided service. The contractor shall provide usage-forecasting data for these items (DR-49).

7.2.2.3 Government Property

The contractor shall provide a Government Furnished Property (GFP) accountability system. Government furnished property to this contract is identified in Appendix 17.

The contractor shall transfer accountability to NASA Contract NAS15-10000 (ISS Development Contract) for any CAPPS assigned hardware launched and remaining on-orbit as part of the configured core station.

The contractor shall receive, tag, inspect, control, record, store, issue, track, and return government property and IP/P assets designated for test and return, integration, and de-integration while utilized at KSC. The contractor shall report on the location and condition of the assets when requested by the government and asset owner.

The contractor shall identify excess and obsolete assets, and initiate disposal.

The contractor shall plan and execute the disposal of the items that resulted from the termination of the Payload Carriers Program.

The contractor shall plan and execute the disposal of the Cargo Integration Test Equipment (CITE).

7.2.2.4 Fleet Resource Management

The contractor shall perform the Fleet Resource Management (FRM) function for ISS, in accordance with K-SS-12.15, ISS KSC Logistics Fleet Resource Management (FRM) Implementation Plan. The contractor may utilize the government provided FRM Asset Scheduling Tool (FAST).

7.2.2.5 Procurement

The contractor shall screen for availability through the GFP accountability system and the IMS, prior to initiating any equipment procurement.

7.3 Logistics Engineering

The contractor shall perform logistics engineering functions for new equipment (flight hardware, GSE, and FS&E).

The contractor shall perform logistics engineering functions in support of sustaining engineering for FS&E and GSE as listed in Appendices 5A, 5B, 11, 12, 14 and 16.

The logistics engineering functions include, but are not limited to:

- Supportability engineering
- Maintenance planning
- Spares management

The contractor shall provide the logistics resources identified through the maintenance planning activity for new hardware and systems by the scheduled ORD.

The contractor shall provide spares and materials to support payload processing activities. The contractor shall procure initial spares identified through the maintenance planning activity for assigned hardware and systems.

7.4 Post Production Support Material Management

The contractor shall support the ISS Program by performing material management functions for ISS hardware and assets (flight ORU, SRU, repair parts, and associated support equipment) listed in Appendix 7. The material management function includes all responsibilities, tasks, and functions related to storage, inventory management, kitting, inventory accuracy, tagging, packaging, handling, and transportation.

The contractor shall participate in monthly ISS Program logistics reviews, via teleconference. The participation includes reporting on capabilities, backlogs, metrics, and budget associated with the Post Production Support (PPS) Material Management function.

8.0 Institutional/Support Services

8.1 Training and Certification

The contractor shall plan and implement a training and certification program for all personnel engaged in the inspection, test, checkout, and operation of assigned flight hardware, GSE, and facilities. The contractor shall provide training in accordance with K-STSM-12.05.04, KSC Ground Operations Technical Training Plan.

The contractor shall verify that all contractor personnel are knowledgeable of the laws, regulations, and the government directives concerning their tasks. The contractor is not responsible for the certification of NASA personnel.

The contractor shall maintain and update the assigned KSC area access training courses in digital format. The contractor shall review the KSC area access training course program annually to identify and develop new training courses, as required, and to ensure the content of existing training courses are accurate and complete.

The contractor shall maintain and update the following area access training courses:

- QF28IKSC, Space Station Processing Facility (SSPF) Familiarization
- QF28OKSC, Operations and Checkout (O&C) Building Familiarization
- QF223KSC, SSPF Ammonia Familiarization
- QF28MKSC, MPPF Familiarization
- QF28PKSC, PHSF Familiarization
- QF28SKSC, SAEF-2 Familiarization
- QF28VKSC, VPF Familiarization

The contractor shall provide the government access to their training schedule. The contractor shall permit attendance by government and payload customer personnel in any scheduled training, on a space-available basis.

The contractor shall enter and update training data into the KSC Training and Certification Record System (TCRS) PM50 for all personnel trained per K-STSM-12.05.04, KSC Ground Operations Technical Training Plan.

The contractor shall perform operational training of life support equipment furnished by J-BOSC. During training exercises, the contractor shall set up and operate the equipment for contactor personnel, government personnel, payload customers and payload developers.

8.2 Electromagnetic Measurement and Analysis Services

The contractor shall perform electromagnetic compatibility testing, frequency control and analysis, and associated electromagnetic measurements to satisfy the requirements of the government and their contractors in residence at the KSC/CCAFS, Patrick Air Force Base (PAFB), and outlying facilities, and to support NASA commitments as referenced in the Joint Operating and Support Agreement (JOSA), 45 SW JOP 15E/NASA-KSC 1323, Joint Operating Procedure Between 45th Space Wing And NASA-KSC For Electromagnetic Measurements and Analysis (EMA).

The contractor shall provide operations, maintenance, and sustaining engineering for all systems and equipment associated with the Electromagnetic Laboratory (EML).

8.2.1 Electromagnetic Compatibility

The contractor shall perform testing and analysis of facilities, systems and equipment including:

- EMI testing and analysis
- Electromagnetic signal level investigations
- Power line transient measurements
- RF transmission line characteristics and fault detection

The contractor shall perform electromagnetic compatibility investigations consisting of:

- Susceptibility of equipment to transient environments
- Radiation levels emanating from equipment
- Susceptibility of equipment or systems to radiated fields

The contractor shall measure electromagnetic field intensities, power densities and empirically verify antenna parameters at KSC and the Eastern Range (ER) and other areas per approved requirements. The contractor shall perform tests to ensure compliance with MIL-STD-461 and applicable standards.

The contractor shall operate, maintain and reconfigure as required the Electromagnetic Analysis Mobile Platform (EAMP).

8.2.2 Frequency Control and Analysis

The contractor shall perform Frequency Control and Analysis (FCA) for KSC and the ER.

The contractor shall perform launch site RF surveillance and recording during all KSC and ER launches to ensure local RF sources do not interfere with launch operations.

The contractor shall locate, identify and resolve RFI problems affecting KSC and ELV assets on KSC and the ER.

The contractor shall certify Range Safety transponder parameters for all testing of Command Destruct systems at KSC and the ER.

The contractor shall perform radar beacon transponder parameter measurements for all launch vehicles and beacon equipped aircraft operating on KSC and the ER to insure operating parameters are within required limits prior to launch. The contractor shall provide beacon operation parameters to range radars to ensure accurate vehicle tracking.

The contractor shall perform interference analysis and impact assessments for new emitters operating at KSC and ER.

The contractor shall design, fabricate and test antenna systems including special purpose devices such as transmitters, receivers, control equipment and RF filters.

8.2.3 Re-Radiating Antenna Systems

The contractor shall maintain and operate the Re-Radiating Antenna System (RAS) for KSC and ER.

The contractor shall mount and install antennas, feed-lines and pressurization equipment. The contractor shall perform and document alignment and end-to-end verification of the RAS.

The contractor shall provide customers detailed reports on antenna gain, cable losses, test frequencies, and free space path loss between antennas.

The contractor shall maintain and update the KSC-HB-0004.0, Payload Antenna Repeater System User's Guide. The contractor shall make this guide available to all Space Shuttle and ELV payload customers for payload test planning.

8.2.4 Automated Monitoring System

The contractor shall operate and maintain the Automated Monitoring System (AMS). The contractor shall archive data and distribute to individuals experiencing RF related interference upon request.

8.2.5 Special Projects

The contractor shall provide operations, maintenance, and engineering support to special projects that require the use of equipment and techniques unique to RF and electromagnetic technology as directed by the government.

8.3 Imagery, Graphics, and Reproduction Services

8.3.1 Imagery

The contractor shall provide operational and engineering imagery for tasks required in the performance of KSC payload processing and support for on-orbit operations. Reference Appendix 19 for listing of government furnished imagery equipment.

The contractor shall perform digital imaging for ISS and other Shuttle payloads including:

- Final integration
- Final mates (except for hardware built by the ISS Prime contractor)
- MPLM rack integration and de-integration
- Shuttle integration
- Quality Assurance
- Test and verification (including CEIT)
- Manufacturing
- Non-conformances

The contractor shall store and archive all digital images. PDMS-Digital Imagery Management System (DIMS) is available for CAPPS use as part of the PDMS suite (reference Appendix 16).

8.3.1.1 Imagery Working Group Requirements

The contractor shall provide digital imagery for the following ISS processing activities (excluding International Partner processed hardware) per Imagery Working Group (IWG) Requirements including:

- GFE and payload items
- Flight hardware closeouts
- Final integration

The contractor shall provide and catalog flight hardware imagery to document ISS hardware configuration during assembly, test, integration, closeout and post-flight per Imagery Working Group (IWG) Requirements. The contractor shall provide digital video recording of flight hardware moves, lifts, shuttle integration and post-landing events.

The contractor shall participate in the IWG and prepare Pre-flight Imagery Plans for IWG approval. The contractor shall provide all ISS images to the IWG for input into the DIMS, operated and maintained by JSC.

8.3.2 Graphics and Technical Writing

The contractor shall provide graphics and technical writing in support of processing and training activities for performance of this contract.

8.3.3 Reproduction Services

The contractor shall reproduce documentation as required for payload processing activities per NPG 1490.5, NASA Procedural Guidance for Printing, Duplicating, and Copying Management and S. Pub. 101-9, No. 26, Government Printing and Binding Regulations. The contractor shall acquire, operate and maintain reproduction equipment in contractor documentation centers and report duplicating efforts (DR-50). The contractor shall reproduce classified documents, if required. The contractor shall utilize the services of an approved government printing plant in accordance with the government requirements.

8.4 Janitorial Services

The contractor shall provide clean room janitorial service in contractor operational and technical areas including, but not limited to, processing bays, off-line labs and control rooms. Clean room janitorial services shall include the cleaning of ground support equipment and checkout system racks located in the operational area at a minimum of every six months. The contractor shall maintain clean work areas per K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements Plan.

8.5 Public Affairs

The contractor shall provide technical and logistical support to NASA Public Affairs Office (PAO) when requested. The contractor shall refer any news media access requests to NASA PAO per the requirements of KMI 1301.3, Media Access.